LOVELY PROFESSIONAL UNIVERSITY

TOTAL QUALITY MANAGEMENT

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SYLLABUS

Total Quality Management

Objectives:

- This course is designed to enable the students to organize an internal team to lead the quality improvement efforts and to create awareness about the philosophy of Total Quality Management.
- To identify the problems relating to quality through Customer Satisfaction, Employee Involvement, Failure mode and Effect Analysis etc.
- Students would be designing and installing best practices for quality improvement through Benchmarking, Process Improvement and adherence to International Quality Standards.

S.No.	Description
1.	TQM Framework, Historical Review, Gurus of TQM, Obstacles and Benefits of TQM
2.	Leadership for TQM, 7 Habits, The Deming Philosophy, Quality Council, Core Values
3.	Customer Satisfaction, Perception of Quality, Service Quality, Customer Retention
4.	Employee Involvement, Surveys, Empowerment, Suggestion System, Performance Appraisal
5.	Process Improvement
6.	Benchmarking
7.	Environmental Management Systems ISO 14000 series standards
8.	Quality Function Deployment
9.	Failure Mode and Effect Analysis
10.	Total Productive Maintenance

CONTENT

Unit 1:	Total Quality Management–An Introduction *Neha Tikoo, Lovely Professional University*	1
Unit 2:	Gurus of Quality Management *Neha Tikoo, Lovely Professional University*	18
Unit 3:	Concept of Quality Management *Neha Tikoo, Lovely Professional University*	48
Unit 4:	Leadership for TQM *Tanima Dutta, Lovely Professional University*	67
Unit 5:	Customer Satisfaction *Tanima Dutta, Lovely Professional University*	81
Unit 6:	Service Quality *Tanima Dutta, Lovely Professional University*	93
Unit 7:	Customer Retention *Tanima Dutta, Lovely Professional University*	113
Unit 8;	Employee Involvement *Tanima Dutta, Lovely Professional University*	134
Unit 9:	Process Improvement *Tanima Dutta, Lovely Professional University*	149
Unit 10:	Benchmarking *Manpreet Kaur, Lovely Professional University*	166
Unit 11:	Environmental Management Systems *Manpreet Kaur, Lovely Professional University*	186
Unit 12:	Quality Function Deployment *Manpreet Kaur, Lovely Professional University*	200
Unit 13:	Failure Mode and Effect Analysis *Manpreet Kaur, Lovely Professional University*	218
Unit 14:	Total Productive Maintenance *Manpreet Kaur, Lovely Professional University*	236

Unit 1: Total Quality Management–An Introduction

Notes

CONTENTS

Objectives
Introduction
1.1 Definition
1.2 Origin and Evolution of Quality Management
1.3 Development in the field of Quality
1.3.1 Planning, Control and Improvement
1.4 Terminologies Related to Quality Management
1.5 Summary
1.6 Keywords
1.7 Review Questions
1.8 Further Readings

Objectives

After studying this unit, you will be able to:

- Explain the meaning of total quality management
- Discuss the origin and evolution of quality management
- Explain about the development of TQM in India post independence

Introduction

Total Quality Management (TQM), a buzzword phrase of the 1980s, has been killed and resurrected on a number of occasions. The concept and principles, though simple seem to be creeping back into existence by "bits and pieces" through the evolution of the ISO9001 Management Quality System standard.

"Total Quality Control" was the key concept of Armand Feigenbaum's 1951 book, Quality Control: Principles, Practice, and Administration, in a chapter titled "Total Quality Control". Feigenbaum grabs on to an idea that sparked many scholars interest in the following decades that would later be catapulted from Total Quality Control to Total Quality Management.

Total Quality Management (TQM) is a management strategy aimed at embedding awareness of quality in all organizational processes. TQM has been widely used in manufacturing, education, government, and service industries, as well as NASA space and science programs.

1.1 Definition

According to International Organization for Standardization (ISO):

"TQM is a management approach for an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society."

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One major aim is to reduce variation from every process so that greater consistency of effort is obtained.

TQM is composed of Three Paradigms:

- ***Total*:** Involving the entire organization, supply chain, and/or product life cycle.
- ***Quality*:** With its usual Definitions, with all its complexities.
- ***Management*:** The system of managing with steps like Plan, Organize, Control, Lead, Staff, provisioning and the likes.

TQM is defined as both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. It is the application of quantitative methods and human resources to improve all the processes within an organization and exceed customer needs now and in the future. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach.

Notes Companies who have implemented TQM include Ford Motor Company, Phillips Semiconductor, SGL Carbon, Motorola and Toyota Motor Company.

Self Assessment

Fill in the blanks:

1. W. Edwards Deming, Joseph Juran, Philip B. Crosby, and Kaoru Ishikawa, known as the …….. .
2. …… is a management strategy aimed at embedding awareness of quality in all organizational processes.
3. TQM is the application of …… and ……. to improve all the processes within an organization and exceed customer needs now and in the future.
4. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a…… .

1.2 Origin and Evolution of Quality Management

The roots of Total Quality Management (TQM) can be traced back to early 1920s when statistical theory was first applied to product quality control. This concept was further developed in Japan in the 40s led by Americans.

Example: Deming, Juran and Feigenbaum.

The focus widened from quality of products to quality of all issues within an organization – the start of TQM.

The following shows the history of Total Quality Management, from inspection to business excellence.

1. ***Inspection*:** Inspection involves measuring, examining, and testing products, process and services against specified requirements to determine conformity.

   During the early years of manufacturing, inspection was used to decide whether a worker's job or a product met the requirements; therefore, acceptable. It was not done in a systematic

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way, but worked well when the volume of production was reasonably low. However, as organizations became larger, the need for more effective operations became apparent.

In 1911, Frederick W. Taylor helped to satisfy this need. He published 'The Principles of Scientific Management' which provided a framework for the effective use of people in industrial organizations.

Inspection still has an important role in modern quality practices. However, it is no longer seen as the answer to all quality problems. Rather, it is one tool within a wider array.

2. ***Statistical Quality Control:*** Statistical Quality Control focuses on product and the detection and control of quality problems. It involves testing samples and statistically infers compliance of all products. It is carried out at stages through the production process; and it relies on trained production personnel and quality control professionals.

Did u know? The first to apply the newly discovered statistical methods to the problem of quality control was Walter A. Shewhart of the Bell Telephone Laboratories. He issued a memorandum on May 16, 1924 that featured a sketch of a modern control chart.

Shewart's work was later developed by Deming, Dodge and Roming. However, manufacturing companies did not fully utilize these techniques until the late 1940s.

3. ***Quality in Japan:*** In the 1940s, Japanese products were perceived as cheap, shoddy imitations. Japanese industrial leaders recognized this problem and aimed to produce innovative high quality products. They invited a few quality gurus, such as Deming, Juran, and Feigenbaum to learn how to achieve this aim.

In the 1950s, quality control and management developed quickly and became a main theme of Japanese management.

A by-product of quality circles was employee motivation. Workers felt that they were involved and heard. Another by-product was the idea of improving not only quality of the products, but also every aspect of organizational issues. This probably was the start of the idea, total quality.

4. ***Total Quality:*** The term 'total quality' was used for the first time in a paper by Feigenbaum at the first international conference on quality control in Tokyo in 1969. The term referred to wider issues within an organization.

Ishikawa also discussed 'total quality control' in Japan, which is different from the western idea of total quality. According to his explanation, it means 'company-wide quality control' that involves all employees, from top management to the workers, in quality control.

5. ***Total Quality Management:*** In the 1980s to the 1990s, a new phase of quality control and management began. This became known as Total Quality Management (TQM). Having observed Japan's success of employing quality issues, western companies started to introduce their own quality initiatives.

A typical definition of TQM includes phrases such as: customer focus, the involvement of all employees, continuous improvement and the integration of quality management into the total organization.

6. ***Quality Awards and Excellence Models:*** In 1988 a major step forward in quality management was made with the development of the Malcolm Baldrige Award in the United States. The model, on which the award was based, represented the first clearly defined and

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internationally recognized TQM model. It was developed by the United States government to encourage companies to adopt the model and improve their competitiveness.

In response to this, a similar model was developed by the European Foundation of Quality Management in 1992. This EFQM Excellence Model is the framework for the European Quality Award.

7. ***Business Excellence:*** TQM models are often called Business Excellence Models. Also, TQM itself is now often called Business Excellence. This is to distinguish the "new TQM" from the past work on TQM.

Business Excellence is really the same as TQM, but with a more clearly defined approach.

Caselet

Total Quality Management

Total Quality Management (TQM) is the idea that controlling quality is not something that is left exclusively to the "quality controller", a person who stands at the end of a production line checking final output. It is (or it should be) something that permeates an organization from the moment its raw materials arrive to the moment its finished products leave.

TQM is a process-oriented system built on the belief that quality is a matter of conforming to a customer's requirements. These requirements can be measured, and deviations from them can then be prevented by means of process improvements or redesigns.

The European Foundation for Quality Management (EFQM) said that TQM strategies are characterised by the following:

- The excellence of all managerial, operational and administrative processes.
- A culture of continuous improvement in all aspects of the business.
- An understanding that quality improvement results in cost advantages and better profit potential.
- The creation of more intensive relationships with customers and suppliers.
- The involvement of all personnel.
- Market-oriented organizational practices.

Total quality management was developed by a number of Japanese firms in the 1950s and 1960s. But it was built largely on the teachings of W. Edwards Deming and Joseph Juran, two Americans who had quietly developed the principles in the aftermath of the second world war. With the help of books and articles such as David Garvin's 1983 description in *Harvard Business Review* of the way in which TQM and other techniques were putting Japanese companies streets ahead of their foreign competitors, the idea was later reclaimed by the United States and widely adopted by American business.

Europe, which has at times looked left out of this game of American-Japanese ping-pong, has also made occasional claims to be the fount of total quality. Raymond Levy, chairman of Renault, a French car company, said in the early 1990s:

Quality is representative of a culture which we Europeans have no reason to let others monopolize. The Europe of Descartes; the Europe of the Age of Reason and the Enlightenment; the Europe of the industrial and technological revolution of the last two

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centuries holds within itself all the elements of method and exactitude conveyed by the term "total quality".

In the late 1990s' there was something of a backlash against the implications of TQM, especially in the United States. Florida Power & Light, for example, the first American company to win the prestigious Deming Prize for quality management, cut its TQM program because of its employees' complaints about the excessive amount of paperwork that it required. Douglas Aircraft, a subsidiary of McDonnell Douglas, cut its program to next to nothing. *Newsweek* colorfully described the aircraft company's action: "At Douglas, TQM appeared to be just one more hothouse Japanese flower never meant to grow on rocky American ground."

Self Assessment

Fill in the blanks:

5. ……. involves measuring, examining, and testing products, process and services against specified requirements to determine conformity.
6. The first to apply the newly discovered statistical methods to the problem of quality control was …….. of the Bell Telephone Laboratories.
7. …… focuses on product and the detection and control of quality problems.
8. A by-product of quality circles was……. .
9. The term …….. referred to wider issues within an organization.
10. EFQM Excellence Model is the framework for the…….. .
11. TQM models are often called ……. .

1.3 Development in the Field of Quality

The following table shows that the growth movement in the quality field in India is very slow.

Table 1.1: Evaluation of TQM Related Activities with Changing Socioeconomic Environment in India and Future Projections

Change in the socio-economic environment (Phase)	Development in Quality	QC Tools	QA Systems	Changes of concepts in policy management
1947-1982 India gets Independence • Regulated economy • Slow economic growth • Very low competition	• QC is inspection stage	• Inspection	Regulation of inspection/product audit	
1983-1994 Initial de-regulation phase of economy • Slow growth rate	• Growing quality awareness • Attempted user of QC Circles	• 7 tools of QC	• QA Systems • ISO 9000 QMS compliances	To attach importance to measures or means in addition to targets

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• Imported kits • Emerging domestic competition				
1995-2000 Transition to open economy • Adequate growth rate of economy • Growing domestic competition • Select international competition	• QC in production state (Prevention of defectives)	Statistical methods– • Design of Experiments • Q Tables • EMEA & FTA	• Regulation of process control • QC Chart • Q Table	To attach importance to co-ordination of the management of all divisions
2001-2007 De-regulation of economy High growth of economy Open competition requirements	• QC in design stage • 7 management tools	• Multivariate analysis • Weibull Probability	• Q tables for design qualities specified annually	To attach importance to mid term and long term policies
2008-on wards Self regulated economy • Total integration with global markets • Development of tech. for new products • Steady growth of economy	• QC in research stage	• Subsystem in managing research programme using Q Tables, Product development process control	• Regulation of design review	Transition to strategic management of business through group participation.

Thirty-five years passed away after independence, but the quality movement remained stagnant. Business remained secured because of custom duties and licensing, while the market was regulated by the government. There was no competition. Quality was maintained only by inspection which was a very outdated method. This resulted in wastage of resources as scrap was generated. The customer was the looser.

From 1983-1994 steps were taken to control business activities. Many companies tried the QC Circle concepts, but the result was minimal as the management was not involved. At this time the focus was on making quick money by importing foreign kits. But foreign debt mounted rapidly though the economic growth picked up.

Since 1995 many major policy changes were made due to growing competition at the domestic level. Rate of economic growth dropped and export growth was slow. At such a time, quality became relevant and industry started learning and adopting new quality techniques.

The Indian economy still suffers from low growth rates, low capacity utilization and low price realization the global economic slowdown has made things even more difficult.

The efforts of restructuring, reengineering, and strategizing did not give expected results because the focus was on improving results while stability capability and management process were totally disregarded.

Notes

India can learn from the Japanese experience and the society can benefit and transform in 25-30 years. A broad and generic approach is outlined.

Table 1.2: Quality – The Approach

Propose	Process					Results		Contribution
Vision Mission Values	TPM	Autonomous Maintenance	Productive Maintenance	Overall Equipment Effectiveness	Overall Plant Effectiveness	Cost Delivery Productivity Quality Safe environment Morale	Share-holder satisfaction Customer satisfaction Employee satisfaction	Business growth ↓ Contribution to society ↓ Economic freedom
	TPS LMS	Kanban/JIT/ SMED	Single piece flow	Flexibility/ Automation	------			
	TQM	Vendor Quality	Manufacturing Quality	Field Quality	New Product Development			
	QMS EMS	Process standardization	Process capability	Process improvement	------			
	TEI	Education/ Training	People Involvement	Autonomy/ Daily mgmt.	------			

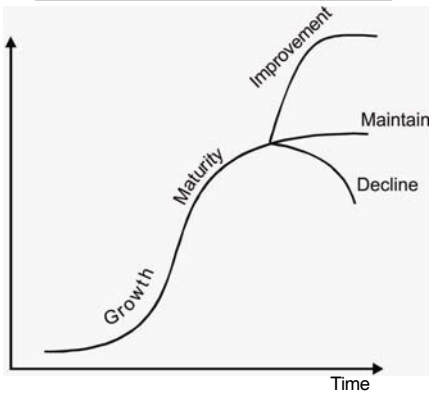
Few organizations in India would be at par with the top 5% quality organizations in developed countries. One of those has won the Deming prize. It is 4th company outside Japan to achieve this distinction.

Now there is a welcome change as Western and Japanese concepts of management are molded according to Indian needs. To succeed in this direction government and business organizations have to work together.

Quality is getting more and more relevant as India is deregulating its economy and is integrating itself with the world system. Customer satisfaction will lead to larger market share.

In the sequence of a life cycle of each aspect, whether individual, product/service or organization one has to follow a normal maturity curve.

Figure 1.1: Maturity Curve



It is evident from the maturity curve, in order to delay the decline with respect to every aspect, improvement is a necessity.

When we start talking about improvement, one very important thing to keep in mind is that it has to be qualitative. It is not that improvements are done in vacuum, they always have a latent quality built into them.

Task Make a report on the development of TQM in India since independence

Notes

One of the famous quality guru Joseph Juran has even based his philosophy on three pillars of quality viz.:

1.3.1 Planning, Control and Improvement

One of the most difficult questions to be answered by managers in the process of quality improvement is "Can Quality Improvement be identified just by looking at it or they need concrete evidences to substantiate their decisions?"

Managers are required to take SMART Decisions for justifying their arguments. SMART is one word which is used very freely in today's economic world. The strategic thinkers and policy makers talk about SMART organizations, which can survive during times of uncertainty. The HR departments are always looking for SMART individuals, who can drive the organizations forward. The production people are always striving to have SMART products/services, which are readily accepted by the customer. The marketing wizards are always involved in the process of innovating SMART promotional strategies to outshine competition and attracting customers. The financial number crunchers are always searching for SMART deployment of financial resources to maximize the returns to the shareholders.

Further, SMART is the undercurrent of every organization. Going into the depth of the analysis one finds that SMART implies:

- S- Specific
- M- Measurable
- A- Attainable
- R- Realistic
- T- Time bound

Thus, we can see that the stress in every decision, whether it is for planning, for control or for improvement is on being objective, which can be justified with proper facts based on data and which is realistic and achievable during a given time-frame.

Quality

Quality is a complex phenomenon based on perceptions by individuals with different perspectives on products and services. These perceptions have been built up through the past experience of individuals and consumption in various contexts. Consequently, quality encapsulates time and other contextual dimensions that add to the complexity of what is essentially a subjective evaluation of the quality of good and/or service by the consumer.

The term "Quality" has been defined in various ways by various persons. However, to be very precise, the definition of quality given by American Society for Quality Control (ASQC) is:

"The totality of features and characteristics of a product or service, that bears on its ability to satisfy given needs."

Perspectives

It is important to understand the various perspectives from which quality is viewed in order to fully appreciate its role throughout the parts of a business organization.

***Judgmental Criteria*:** Often used by consumers, "it is synonymous with superiority or excellence".

Product-based Criteria: "It is a function of a specific measurable variable and that differences in the quality reflect differences in quantity of some product attribute."

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User-based Criteria: "Fitness for intended use, "or how well the product performs its intended function. Based on the presumption that quality is determined by what a customer wants.

***Value-based Criteria*:** That is as useful as competing products and is sold at a lower price or one that offers greater usefulness or satisfaction at a comparable price.

It incorporates a firm's goal of balancing product characteristics (the customer side of quantity) with internal efficiencies (the operations side).

***Manufacturing-based Criteria*:** "As the desirable outcome of engineering and manufacturing practice, or conformance to specification."

It provides a means of measuring quality. It is meaningless, however, if they do not reflect attributes that are deemed important to the consumer.

Integrating Perspectives on Quality

Eight principal quality dimensions defined by Garvin are:

- ***Performance*:** This refers to the primary operating characteristics of the product or service; they are usually measurable, e.g., miles per gallon, time for 0 to 60 miles for a car; number of rooms, baths etc. in a house.
- ***Features*:** These are additional characteristics that enhance the product/services appeal to the user, e.g., deleaded ink used for newspapers, glare reducing coatings on bulbs etc.
- ***Reliability*:** Is the precision with which the product or service meets the specified standards. Approaches such as using pre-specified tolerance limits, Taguchi's quality loss function, Motorola's 6S (six sigma) limits.
- ***Conformance*:** Garvin (1988) came up with eight dimensions of quality to link customer requirements to engineering design.
- ***Durability*:** Durability measures the length of a product's life, e.g., light bulbs, car mufflers. When a product can be repaired, estimating durability is more complicated.
- ***Serviceability*:** Serviceability is the speed with which the product can be put into service when it breaks down, as well as the competence and behavior of the service person. The speed of service can be measured by response time and mean time to repair (MTTR).
- ***Aesthetics*:** Aesthetics is the subjective dimension indicating the kind of response a user has to a product. It represents the individual's personal preference – the ways an individual responds to the look, feel, sound, taste, and smell.
- ***Perceived Quality*:** This is also a subjective dimension: It is the quality attributed to a good or service based on indirect measures, for example, inferring the quality of an airline by the cleanliness of the flip-down tray. Well maintained tools and an immaculate workplace may indicate a good workman.

It is universally recognized that Quality and Reliability contribute to customer loyalty, national reputation and greater share of overseas markets. Yet, in the manufacture and supply of goods and services, organizations in most countries (with the exception of Japan and South Korea) seem to ignore this factor while setting up corporate objectives.

Even in respect of 'services', Japan is not all that 'hot'. Taking Japan Airlines for example, when there is any slight deviation from normalcy, the quality of service to customers, both in-flight and on the ground, takes a deep plunge.

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There are many reasons for this lack of 'quality-consciousness'. Many countries are highly permissive above quality standards. They are too tolerant about substandard goods. They are not overly perturbed over having to get their car, television or VCR repaired half a dozen times within a few months of their purchase. This public apathy acts as no incentive for the manufacturing or the service sector.

One main reason why top management does not make quality a personal and an organizational commitment can be attributed to the organizational structure. All companies and service organizations do have a Quality Control department. The exact nomenclature may vary. But the setting up of a separate Quality Department contributes to a disastrously misconceived notion that quality is the sole responsibility of the Quality Assurance department. Thus the concept needs an immediate and drastic change.

The responsibility for the organization, direction and control of quality must be vested at the highest, level i.e. CEO and the implementation ought to be the task of everyone.

The role of the Quality Assurance Department must be radically transformed. It should be one of setting specifications. It should analyze defects and recommend "once-for-all' remedial measures. They should explore simple and foolproof methods of continuously preserving the prescribed standards. They should not be 'line' inspectors. On-line quality assurance should be the onus of person actually performing the task. This would not only increase quality-consciousness among workers but also indirectly motivate them because of the trust and responsibility vested in them.

Vaugh Beale of the Harley-Davidson Motorcycle Company of USA tried this approach in his struggle for the revival of his Company. He persuaded his two labor union leaders to agree that each operator will assume responsibility not only for the quality of his production but also for their lubrication and calibration of his machine. Within a few years, he had transformed his Company into a profit making enterprise.

Contrary to popular belief, several studies have revealed that only about 20 per cent of the defects can be directly attributed to the production shop floor.

A major culprit is deviations from the original design, either cursorily approved by the design department or, more often arbitrarily authorized by the process planner or the production manager. These are introduced as stop gap measures because of temporary problems concerning materials or machine. But, the deviations continue as standard practice, even after the situation returns to normalcy.

The organizational policy with respect to deviations should be extremely strict and authorized only by the top management and that too for a specific duration only.

An axiom that companies should meticulously follow is "if you are manufacturing a standard product to a carefully drawn-up design, integrated with quality and reliability, do not touch 'specialized', or 'custom-built' or 'tailor-made' orders from a small segment of the clientele".

The other non-production departments that add on to negative costs of defects are: the purchase (not having a strict control over vendors, ignoring vendor development, indifferent 'in' – inspection); maintenance (inconsistent preventive maintenance and calibration); design and process planning (not facing the realities of the production and assembly problems) and some senior management who, in their desperate struggle to meet the prescribed targets, condone laxity in quality standards and, thus, increase after-sales rectification costs which can run quite high.

***The human factors*:** The oft repeated question is 'If Japan can do it, why can't we?". This shows lack of appreciation of cultural differences between societies. Intensive and specialized training is essential for the maintenance of quality. But, even after thorough training, quality-awareness does not come as a second nature to workers in many countries.

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The members of many societies are individualists. They would like to exercise their freedom of action, display their initiative and perform their tasks in their own style. Though there is nothing wrong with these traits, they prove to be counter-productive as far as quality is concerned in an industrial or service organization.

Quality assurance demands a strict and disciplined approach to performance at work, brooking no deviations. In any process system of operations, where an operator does the same job, hour after hour and day after day, the discipline imposed by quality requirements can become very irksome. In many cases it induces boredom which, in turn, results in inattention, carelessness and errors.

This is where comparing ourselves with the Japanese becomes a futile exercise. The ethnic and cultural background of the Japanese make them subordinate their individualism totally to the higher and overall interests of the institution for which they work. They have infinite patience and carry out repetitive jobs without the least sign of boredom. They abhor deviations and revel in conformity. These are the principal reasons why the Japanese workers are able to maintain consistent quality standards without any checks or supervision.

***Motivation*:** How, then, can other societies make their workers acutely aware of the need to maintain quality standards as an innate and consistent way of work-life? The organizational, structural and policy changes discussed previously would help to a great extent. Investing the worker with trust and responsibility by making him totally accountable for the quality of his own work, without an inspector or a supervisor breathing down his neck, would sustain his interest in quality.

In addition, top management must device other ways, in tune with the culture of the society and the attitudes of the workforce, to get the workers attuned to the disciplined nature of the demands of quality. Imitating the Japanese by forming Quality Circles has not produced any appreciable results in India and many countries.

***How Much Quality?*:** There is a constant exhortation to produce goods or services of the highest quality. It must be realized that quality is relative to the product or service.

Henry Ford wanted only that amount of quality and reliability built-in that would enable his cars to last a limited number of years. He priced the car low and geared up for a faster turnover in his mass-production line while Rolls Royce designed a lifetime car and priced it high. That they went bankrupt some years ago is neither here nor there.

The standard of quality must be optimal to suit the product or the service. A newspaper printed on the highest quality of white glossy paper with the best black ink would, in the long run, affect the readers eyesight due to strong 'brightness contrast'. The same is the case with many products like shorthand notebooks, throwaway syringes and short life-cycle products.

Self Assessment

Fill in the blanks:

12. Business remained secured because of custom duties and licensing, while the market was regulated by the……. .
13. Quality is getting more and more relevant as India is …… its economy and is ……. itself with the world system.
14. In order to delay the decline with respect to every aspect, ……. is a necessity.

Notes

1.4 Terminologies related to Quality Management

Quality Control

Quality control refers to all those functions or activities that must be performed to fulfill the company's objectives.

It is systematic control of all those variables which affects the quality of a product.

It aims at prevention of defects.

Inspection

Inspection is the process of comparing actual quality characteristics of a product with a predetermined or specified set of standards in order to segregate good products from bad products.

Quality Assurance

Quality Assurance is any action directed toward providing customers with goods and services of appropriate quality.

It relies on comprehensive system of planning, documentation, statistical process control and certification of product.

Total Quality Control (TQC)

TQC can be defined as an effort of continuous quality improvement of all processes, products and services through universal participation that results in increased customer satisfaction, loyalty, and improved business results.

TQM is the foundation for activities, which include:

- Commitment by senior management and all employees
- Meeting customer requirements
- Reducing development cycle times
- Just-in-Time/Demand Flow Manufacturing
- Improvement teams
- Reducing product and service costs
- Systems to facilitate improvement
- Line Management ownership
- Employee involvement and empowerment
- Recognition and celebration
- Challenging quantified goals and benchmarking
- Focus on processes/improvement plans
- Specific incorporation in strategic planning

This shows that TQM must be practiced in all activities, by all personnel, in Manufacturing, Marketing, Engineering, R&D, Sales, Purchasing, HR, etc.

It focuses on total satisfaction of customer through continuous improvement.

Self Assessment

Notes

Fill in the blanks:

15. ……. refers to all those functions or activities that must be performed to fulfill the company's objectives.
16. Quality control aims at ……. of defects.
17. …….. is any action directed toward providing customers with goods and services of appropriate quality.
18. TQM focuses on total satisfaction of customer through……. .

Case Study

Toyota Contract Workers

While lifetime employment has been the norm for a portion of the workers in Japan, recessionary economic systems have made this trend difficult if not impossible for some corporations. In an effort to eliminate the costly lifetime employment contract while at the same time avoiding lay-offs, organizations led by Toyota Motor Corporation have created a new category of temporary professional workers for labour force in Japan.

These temporary workers will have limited of one year contracts. Employees like automotive designers will not be offered customary life time employment. The company will pay these employees a salary based on individual merit rather than the past pay practice of linking pay to seniority and overall company performance.

According to Toyota "As business conditions surrounding Japanese Corporations underwent radical change, it was inevitable that the rigid organizational structure of past would impose limits on the corporate growth".

Toyota President Tatsuro Toyoda plans to gradually increase the number of white collar contract workers in Japan. Other Japanese organization may follow Toyota's trend. The number of white collar contract employees in increasing and this class of workers is easier to terminate than life time workers. Contract workers in blue and white collar segments increased from 14 percent in 1989 to 19 percent in 1993. These temporary workers will be the safety valve during the cyclical economic conditions. The practices will reduce the number of white collar workers blamed for many corporate earning declines. According to a leading Japanese organization, executives agree Japan "must thoroughly revise the life time employment system".

Questions

1. Make a brief presentation of the case.
2. What do you think the Japanese revising their employment trend?
3. What are the advantages and disadvantages of the new employment practice?
4. Are Japanese attempting to adopt an American style employment and evaluation policy?
5. Would the former lifetime employment system work for US companies? Why?

Notes

1.5 Summary

- "Total Quality Control" was the key concept of Armand Feigenbaum's 1951 book, Quality Control: Principles, Practice, and Administration, in a chapter titled "Total Quality Control".
- Total Quality Management (TQM) is a management strategy aimed at embedding awareness of quality in all organizational processes.
- TQM is defined as both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization.
- During the early years of manufacturing, inspection was used to decide whether a worker's job or a product met the requirements.
- Statistical Quality Control is carried out at stages through the production process; and it relies on trained production personnel and quality control professionals.
- In the 1950s, quality control and management developed quickly and became a main theme of Japanese management.
- In 1988 a major step forward in quality management was made with the development of the Malcolm Baldrige Award in the United States.
- The efforts of restructuring, reengineering, and strategizing did not give expected results because the focus was on improving results while stability capability and management process were totally disregarded.
- In the sequence of a life cycle of each aspect, whether individual, product/service or organization one has to follow a normal maturity curve.
- Joseph Juran has based his philosophy on three pillars of quality: Planning, Control and Improvement.
- Eight principal quality dimensions defined by Garvin are: performance, features, reliability, conformance, durability, serviceability, aesthetics and perceived quality.
- Quality Mission of Life Insurance Corporation of India Ltd. is to explore and enhance the quality of life through financial security by providing products and services of aspired attributes with competitive returns.
- Quality Policy of Mitsubishi HiTech is continuous fulfillment of customer requirement and specification.
- Quality assurance demands a strict and disciplined approach to performance at work, brooking no deviations.

1.6 Keywords

Aesthetics: The philosophical theory or set of principles governing the idea of beauty at a given time and place is known as aesthetics.

Business Excellence: Business excellence is the systematic use of quality management principles and tools in business management.

Conformance: Conformance refers to certification or confirmation that a good, service, or conduct meets the requirements of legislation, accepted practices, prescribed rules and regulations, specified standards, or terms of a contract.

Customer Focus: The orientation of an organization toward serving its clients' needs is called as customer focus.

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EFQM Excellence Model: It is used by thousands of organizations across Europe.

Inspection: The testing of a part to ensure that it meets its design specifications is known as inspection.

ISO9001: ISO9001 is one of the standards within the range of **ISO 9000 standards which** addresses various aspects of quality management.

Malcolm Baldrige Award: The Malcolm Baldrige National Quality Award (MBNQA) is presented annually by the President of the United States to organizations that demonstrate quality and performance excellence.

Perceived Quality: Consumer's opinion of a product's (or a brand's) ability to fulfill his or her expectations is known as perceived quality.

Quality Assurance: Quality Assurance (QA) is a process-centered approach to ensuring that a company or organization is providing the best possible products or services.

Quality Circle: Quality circle is a group of employees who perform similar duties and meet at periodic intervals, often with management, to discuss work-related issues and to offer suggestions and ideas for improvements, as in production methods or quality control.

Quality Control: Quality control is a process that is used to ensure a certain level of quality in a product or service.

Reengineering: Reengineering means systematic starting over and reinventing the way a firm, or a business process, gets its work done.

Restructuring: It means a significant modification made to the debt, operations or structure of a company.

Statistical Quality Control: Statistical Quality Control (SQC) is the term used to describe the set of statistical tools used by quality professionals. SQC is used to analyze the quality problems and solve them.

Total Quality Management: Total quality management is a management system for a customer-focused organization that involves all employees in continual improvement.

1.7 Review Questions

1. Explain the concept of Total quality Management.
2. Define TQM.
3. Write a note on the evolution of TQM from inspection to business excellence.
4. Explain the philosophy of Joseph Juran.
5. Explain in detail the history of Total Quality Management.
6. What are the eight principal quality dimensions defined by Garvin? Explain.
7. Write a long note on the development of quality management in India.
8. "TQM is here to stay." Explain in Indian context.
9. Give their quality mission:
   (a) BPL Ltd.
   (b) LIC India Ltd.
   (c) Airtel

Notes

(d) Infosys

(e) Anand Group

10. Write a short note on:

(a) Quality Control

(b) Inspection

(c) Quality Assurance

(d) Total Quality Control

Answers: Self Assessment

1. Big four
2. Total Quality Management
3. Quantitative methods; human resources
4. Disciplined approach
5. Inspection
6. Walter A. Shewhart
7. Statistical Quality Control
8. employee motivation
9. total quality
10. European Quality Award
11. Business Excellence Models
12. Government
13. Deregulating; integrating
14. Improvement
15. Quality control
16. Prevention
17. Quality Assurance
18. Continuous improvement

1.8 Further Readings

Books

Besterfield Dale H. (2011). *Total Quality Management*. Pearson Education.

Charantimath M. Poornima (2009). *Total Quality Management*. Pearson Education.

Mukherjee N. P. (2006). *Total Quality Management.* PHI Learning Pvt. Ltd.

Nigam. Shailendra (2009). *Total Quality Management.* Excel Books.

Notes

Online links

http://asq.org/learn-about-quality/total-quality-management/overview/overview.html

http://www.wiley.com/college/sc/reid/chap5.pdf

http://www.scribd.com/doc/19494376/Chap-1-Historical-Development-of-TQM

http://www.businessballs.com/dtiresources/total_quality_management_TQM.pdf

Notes

Unit 2: Gurus of Quality Management

CONTENTS

Objectives

Introduction

2.1 TQM Guru: An Introduction

2.2 W. Edwards Deming

2.2.1 Management Responsibility

2.2.2 Deming's Fourteen Points

2.2.3 Deming's Deadly Diseases and Sins

2.3 Joseph M. Juran

2.3.1 Quality is Fitness to Use

2.3.2 Juran's Quality Trilogy

2.3.3 Juran's Six Stage Methodology

2.3.4 Juran's 10 Steps of Quality Improvement

2.4 Philip B. Crosby

2.4.1 Crosby's Four absolutes of quality

2.4.2 Crosby's Six C's

2.4.3 Crosby's 14 Steps of Quality Improvement Plan

2.5 Armand v. Feigenbaum

2.5.1 Stages of Industrial Cycle

2.6 Bill Conway

2.6.1 Conway's Quality Improvement Tools

2.7 Kaoru Ishikawa

2.7.1 Ishikawa's Statistical Techniques to CWQC

2.8 Genichi Taguchi

2.8.1 Signal-to-noise (Deviation)

2.8.2 Orthogonal Arrays

2.9 Shiego Shingo

2.10 W.G. Ouchi

2.11 Vilfredo Pareto

2.11.1 Pareto's Law

2.11.2 Pareto's Diagram

Contd...

Notes

2.12 Tom Peters
2.13 S R Udpa
2.14 Summary
2.15 Keywords
2.16 Review Questions
2.17 Further Readings

Objectives

After studying this unit, you will be able to:

- Explain the contribution of various TQM Gurus
- Discuss and differentiate the philosophies of the TQM Gurus

Introduction

Previous unit gave you an insight on the meaning of total quality management and its development over the years. In this unit, you will study about the different TQM gurus and their contribution in this field.

2.1 TQM Guru: An Introduction

A TQM Guru is an expert thinker who communicates his thoughts through verbal and written expressions and thus contributes to the field of TQM. Starting just after World War II a number of philosophers and thinkers have made their contributions to the movement of "Total Quality Management". In the summer of 1985 the name "Total Quality Management" was first suggested by Nancy Warren, a behavioral scientist in the US Navy, according to Marry Walton (1990). Thereafter, a number of TQM Gurus have made their significant contributions. Many of the TQM Gurus are Americans and a very few of them significant contributors.

Did u know? Some of the major contributions towards the thought of TQM are: (i) M. Edwards Deming (ii) Joseph M. Juran, (iii) Philip B. Crosby, (iv) Armand V. Feigenbaum (v) Bill Conway, (vi) Kauru Ishikawa, (vii) Genichi Taguchi, (Viii) Shigeo Shingo, (ix) W.G. Ouchi, (x) Vilfredo Pareto, (xi) Tom Peters, (xii) S.R. Udpa, (Xiii) Stephen Covey, and (xiv) J.S. Oakland.

Self Assessment

Fill in the blanks:

1. A ……. is an expert thinker who communicates his thoughts through verbal and written expressions and thus contributes to the field of TQM.
2. The name "Total Quality Management" was first suggested by…… .

2.2 W. Edwards Deming

Dr. W. Edwards Deming was born on 14 October, 1990. He was awarded his doctorate in mathematical physics in 1928. He then worked in the US Government census for many years,

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particularly in statistical sampling techniques. In 1943 he published a technical book–'Statistical Adjustment of Data'.

Deming is regarded as "the quality Guru who never gave up," writes John A. Byrne while remembering Edwards who taught American managers that quality matters described Deming at the age of 93 years as a frail figure in three piece pinstripes, with bifocals, hearing aids in both ears and thin white hair. He said, "My experience with Deming was pleasant one when I interviewed him." He described Deming as a Cranky, obstinate, and obscure. He asked as many questions as he volunteered answers. He spoke in waspy staccato, in short, declarative sentences, many of them followed by awkward pauses. Deming by then was concerned that he had run out of time. Despite success stories of Xerox, Motorola and many other companies that embraced his teachings, Deming felt he was a prophet without honor in his own country. Deming achieved credibility in the US only late in his long career, despite his status as Japan's great American censor. The former Census Bureau statistician visited Japan in 1947, as a consultant to help in the work of rebuilding the nation. Year after year he returned to lecture the leading business executives on how to use statistics and to determine how consumers define quality.

Beneficial effects of Deming's programs were seen such as reductions in scrap and rework. However, these advances did not have a lasting effect after the war. In the home market anything that was produced was sold with or without statistical or quality control. A second factor had a strong bearing on Deming's later success. To quote him: "the courses were well-received by engineers but management paid no attention to them. Management did not understand that they had to get behind improvement of quality and carry out their obligations from the top down. Any instability can help to point out specific local problems. Once these local problems are removed, there is process that will continue until someone changes it. Changing the process is management's responsibility and we failed to teach them that."

After the World War II, Deming was invited by Japan as an Adviser to the Japanese Census. He became involved with the Japanese Union of Scientists and Engineers (JUSE) after its formation in 1946.

In his desire to ensure that the Japanese would have reliable radios (to improve occupation communications), General Douglas MacArthur engaged American communications section, to teach the Japanese how to manage modern manufacturing plants. As a part of their efforts they offered an eight-week seminar for Japanese executives, including course on statistical quality control. Sarasohn wrote a textbook in Japanese titled; The Industrial Application of Statistical Quality Control. The Japanese Union of Scientists and Engineers (JUSE) was intrigued by Sarasohn's book and prevailed upon the Economic and Scientific Section of MacArthur's staff to bring Dr. W. Edwards Deming to lecture in Japan, a former statistician with the US Census Bureau. Deming had helped MacArthur's staff with a census of the Japanese population.

Did u know? Deming's first lecture: "Elementary Principles of the Statistical Control of Quality", was delivered in July 1950 to 230 Japanese engineers and scientists.

Deming taught a new philosophy of quality that had evolved from his work with the war production to improve American war material. Japanese readily embraced Deming's theories and techniques. By 1979 quality management had propelled Japan into a leadership position in the world. With "Made in America" label, most of the management theories and practices that once seemed idealistic and theoretical became practical and realistic in Japan.

In 1951, Japan instituted the much-cherished Deming Prize for corporate quality in the honor of Dr. Deming.

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Notes In 1956, Deming was awarded the Shewhart Medal by the American Society for Quality Control. Four years later in 1960, Deming's teachings were widely known in Japan and the Emperor awarded him the Second Order of the Sacred Treasure.

It was not until the 1970s, however, that Deming started to make an impact in the West. This appeared to happen when in 1979, Bill Conway, President of Nashua Corporation met with Deming. A National Broadcasting Corporation television documentary broadened his audience in 1980. It was entitled: "If Japan can, why can't we?" Throughout 1980s, various books were written by others to document and explain his work. His own book *Out of the Crisis* was published in 1986 and was awarded the National Medal of Technology in America the following year. Also in 1987, the British Deming Association was formed to spread awareness of the Deming's philosophy.

In the later 1960s, Deming's thinking could perhaps best be expressed as "management by positive cooperation". He talked about the new climate which consisted of three elements. These are: joy in work, innovation and cooperation. He referred to this new climate as "win-win', as opposed to the "I win: you lose" attitude engineered by the ethic of competition.

John O.Whitney, Director of Deming Centre for Quality Management at Columbia University, recalls occasionally asking the Guru–how things were going. He'd say, "John, I am desperate there is not enough time left." There was something he needed to say to the world, and he was going to do it as long as he could.

This explains why even at the age of 93 Deming was not about to give up. In his final year, he led 34-day seminars despite suffering from prostate cancer and the loss of much of his hearing. Till the end he never lost his enthusiasm or his sense of urgency. What he scribbled on the blackboard few years ago "Why are we here?" to which he answered himself, "To have fun and may be learn a little," is as good as an epitaph as any. In his own way, Deming had fun and taught American managers something that a few who heard him will not forget: "Quality matters and it starts not at the factory floor but at the very top."

On 20 December, 1993 at the age of 93, he collapsed on a stage in Rochester, New York, and was rushed to the hospital where doctors declared him dead. At his last seminar in California in early December, he spoke from a wheel chair while tethered to an oxygen tank.

Deming encouraged Japanese managers and engineers to go beyond the utilization of statistics and strive for continuous improvement. The Shewhart Cycle of "Plan-Do-Check-Act" was revised by Deming to include "Study" rather than PDSA Cycle (Plan, Do, Study and Act). He said: "One has to analyze and think at study stage of the cycle and then act." Deming convinced Japanese managements that the purpose of using quality management techniques was to help companies stay in business.

Deming also drew of Japanese managers to the need for using modern consumer research, conducting regular customer surveys and following closely the developments and changes in the marketplace, in order to be able to plan and act positively. Deming stressed that the efficient use of statistical techniques ensures positive competitiveness in the marketplace and the obtainment of the desired returns.

2.2.1 Management Responsibility

Deming strongly believed that quality improvement had to be management led. He saw management responsibility in two main areas:

(i) To create a positive climate for quality improvement, and

(ii) To emphasize knowledge of workers rather than rigid systems.

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To create a positive climate for quality improvement, it is management's responsibility to make sure that work is fund and the workers must enjoy it and do it for a purpose as of their self-esteem. Deming stressed the importance of what he calls intrinsic motivation (self-esteem as the individual responsibility for what he or she does) rather than extrinsic motivation (accept once the material rewards for work carried out). Deming believed that the present work culture in Western countries has destroyed workers' by depriving them of enjoying what they do and by placing emphasis on merit system based on results.

In an interview just before his death Deming concluded: "Through work an individual should get self-esteem and joy. It should give him a feeling that he is doing something useful and in position to improve it. Otherwise work becomes characterized by extrinsic motivation (the wage acceptance for a day's work) which is humiliating".

To emphasize knowledge of workers rather than rigid system, Dr. Deming was of the opinion that our job is to increase the knowledge and skills of the worker. We should not make him/her or treat him/or as cog in the wheel as F.W. Taylor did in his scientific management where he tried to compare people with machines and fitted them on machines rather than adjusting machines to the ability and skill of persons. Taylor tried to design piece-rate wage system whereby low producers were penalized whereas high producers were rewarded. Deming said you must develop the "human being" in worker by improving his/her brainpower through continuous training and education. Rigidity does not solve any problem. It is flexibility which creates humility and values and thus finds solution to all sorts of problems. He laid special emphasis on the knowledge and skills development of workers. Deming claimed that many errors which occur in organizations were caused by existing systems which were impractical, too right and inaccurate rather than the system work by trying to reduce costs and make money for their organizations. Questioning figures to achieve good results can only make things worse rather than better. For so long the West has placed emphasis on efficiency and asking people to do their best without closely questioning their degree of knowledge. Deming concludes: "We would be better off if people did not do their best. People doing their best have ruined us. There is no substitute for knowledge."

2.2.2 Deming's Fourteen Points

Deming's Fourteen Points:

1. Create constancy of purpose toward improvement of product and service, with the aim to become competitive and thus to stay in business, and to provide jobs.
2. Adopt the new philosophy. We are in a new economic age. We no longer need to live with commonly accepted delays, mistakes, defective materials and defective workmanship.
3. Cease dependence on mass inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
4. End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any item, on a long-term relationship of loyalty and trust.
5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
6. Institute modern methods of training and education on the job, including management.
7. Institute leadership. The aim of supervision should be to help people, machines and gadgets to do a better job.
8. Drive out fear, so that everyone may work effectively for the company.

Notes

9. Break down barriers between departments. People in research, design, sales and production must work as a team and foresee problems of production and in use that may be encountered with the product or service.
10. Eliminate slogans, exhortations and targets for the workforce asking for zero defects and new levels of productivity. Such exhortations only creates adverse social relationships, as the bulk of the courses of low quality and low productivity belong to the system and thus lie beyond the power of the workforce.
11. (a) Eliminate work standards on the factory floor, (b) Work standards (quotas) on the factory floor, substitute leadership, (c) Eliminate management by objectives. Eliminate management by numbers.
12. (a) Remove barriers that rob the hourly worker of the right to pride of workmanship. The responsibility must be changed from sheer numbers of quality. (b) Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means, *inter alia,* abolishment of the annual or merit rating and of management by objectives.
13. Institute a vigorous program of education and self-development.
14. Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job (through company-wide quality improvement).

2.2.3 Deming's Deadly Diseases and Sins

The fourteen points can be seen as the ingredients which organizations require to carry out the total transformation that is based on company-wide quality improvement philosophy. Deming also warns about the obstacles which may inhibit the implementation of the fourteen principles. These have been referred to as the "deadly diseases" and the "deadly sins". These are discussed below.

Deadly Diseases

(i) ***Lack of Consistency:*** Lack of consistency of purpose is to stay in business by not planning to provide products and services in the future, with a specific market in mind, in order to keep the company in business and providing for job creation.

(ii) ***Short-term Profits:*** Short-term thinking defeats constancy of purpose to stay in business with long-term growth.

(iii) ***Performance Appraisal:*** The effects of performance appraisal (personal review system, evaluation of performance, annual review, etc.) are devastating.

(iv) ***Job-hoping:*** Mobility of management causes instability, leads to decisions being made by people with little knowledge and understanding of business activities and who feed from their experiences in different situations.

(v) ***Use of Only Visible Figures:*** Management should not just refer to visible figures. Although these are important, management should learn how to manage their businesses by taking a wider and more global approach (the figures that are unknown are even more important).

Deadly Sins

The two deadly sins which Deming considered to be the most important are:

(i) ***Evaluation of performance,*** i.e. merit rating or annual review, and

(ii) ***Running a company on visible figures only.***

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Deming is perhaps the most respected TQM Guru with a tireless dedication and commitment to help businesses worldwide implement quality improvement concepts and techniques. He still considered his mission as promoting the concept of joy in work and learning. He was awarded the Second Order of the Sacred Treasure which is Japan's premier imperial honor. The Deming prize is considered as one of the highest and most coveted honors. The Deming Associations are formed world-over to teach the Deming quality management philosophy to senior managers.

Self Assessment

Fill in the blanks:

3. …….. is regarded as "the quality Guru who never gave up," writes John A. Byrne.
4. Any ……. can help to point out specific local problems.
5. Deming had helped ……. with a census of the Japanese population.
6. In 1956, Deming was awarded the …… by the American Society for Quality Control.
7. Deming encouraged Japanese managers and engineers to go beyond the …… and strive for continuous improvement.
8. Taylor tried to design …… wage system whereby low producers were penalized whereas high producers were rewarded.
9. It is …… which creates humility and values and thus finds solution to all sorts of problems.
10. ……. thinking defeats constancy of purpose to stay in business with long-term growth.
11. The …… is considered as one of the highest and most coveted honors.

Caselet

What Every 21st Century Manager Needs to Know

Dr. W. Edwards Deming's principles support the global success of Toyota, Proctor & Gamble, Ritz Carlton, Harley-Davidson, and many other leading organizations. His teachings are essential for the effective application of Six Sigma, Lean Manufacturing, and Loyalty/Net Promoter and other quality improvement, customer retention and business growth methods.

Dr. Deming's profound, yet simple; success strategies offer your organization a proven system to achieve lasting growth and success. The principles apply universally to business, healthcare, education—in fact, to any enterprise—and to you personally.

Ironically, this American prophet—still unknown to most of his countrymen—created the theory behind today's successful business practices. He is a national hero in Japan. The highest award for quality in Japan—a Nobel Prize for business success—is the Deming Prize, awarded with great fanfare every year. Dr. Deming helped Toyota—and other leading Japanese exporting companies—develop the vital management philosophy and

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practices that enabled them to become market leaders around the world. Dr. Shoichiro Toyoda, Chairman and former President (1982-1999) of Toyota, said:

Every day, "I think about what he meant to us. Deming is the core of our management". In 2005, accepting the American Society for Quality's Deming Medal, Dr. Toyoda elaborated: "…Dr. Deming came to Japan following World War II in order to teach industry leaders methods of statistical quality control, as well as to impart the significance of quality control in management and his overall management philosophy. He was an invaluable teacher…, playing an indispensable role in the development and revitalization of post-war Japan.

Industrialists as well as academics earnestly began to study and implement Dr. Deming's theories and philosophy. Dr. Deming soon became widely known not only as a brilliant theorist, but also as a kind and modest man. In 1951, the Deming Prize was founded in order to promote the widespread practice of quality control based on Dr. Deming's philosophy.

We at Toyota Motor Corporation introduced TQC in 1961, and in 1965 were awarded the Deming Application Prize…. As we continued to implement Dr. Deming's teachings, we were able to both raise the level of quality of our products as well as enhance our operations on the corporate level. I believe that TMC today is a result of our continued efforts to implement positive change in pursuit of the Deming Prize…

Now, we are faced with rapid global restructuring of both society and business. In the midst of these overwhelming changes, corporations faced with the challenge of providing value to a wide range of shareholders have begun to focus on quality innovations such as completely customer-oriented management practices, environmental preservation, and the upholding of corporate ethics.

Source: http://www.managementwisdom.com/weddechofqua.html

2.3 Joseph M. Juran

Dr. Joseph M. Juran has also contributed a lot to the movement of total quality. He raised pertinent questions on the contribution of quality in reducing costs and improving standards in his book titled: Quality Control Handbook in 1951 which has subsequently become an essential reference book on quality. Juran's work started later than Deming after the World War II during rebuilding of Japanese economy. Juran was an engineer by profession working in the USA. He was invited Japanese in 1954 to contribute to the rebuilding of Japanese economy and speak on planning, organizing and managing quality programs. Juran is the founder Chairman of the Juran Institute. He is also the author of many books and hundreds of research papers and articles related to subjects to quality. He has acted as consultant to many major industrial organizations and governments. He is still in great demand as an international speaker. He has been awarded over thirty medals, fellowships, and honorary memberships in more than twelve countries. He was awarded the Second Order of Sacred Treasure by the Emperor of Japan, the highest decoration given to a non-Japanese citizen for helping the development of quality control in Japan. Juran is known for his development of the concepts of determining the avoidable and unavoidable costs of quality, company-wide quality management and quality Trilogy.

Juran's approach to quality control and its management is two-sided:

(i) ***Companies Mission in Terms of Fitness of Use:*** This is done by providing products and service which conform to customer specifications plus issues of reliability, availability, maintainability, customer service, etc.

Notes

(ii) ***The role of Senior Managers in Providing Leadership:*** This is for managing the required resources in encouraging awareness and participation and in developing systems of policy, goals, plans, measures and controls for quality.

2.3.1 Quality is Fitness to Use

Juran has said that one of the chief obstacles to achieving is disagreement over the meaning of quality and the key words associated with it. He defines quality as, "fitness to use" which breaks into the two components.

(i) ***Quality Consists of those Product Features that meet Customer Need:*** Product features provide customer satisfaction. The product is output of any process and includes goods and services. The customer is any one affected by the goods or services and can be internal or external.

(ii) ***Quality Consists of Freedom from Deficiencies:*** Measures of deficiency are calculated by dividing the frequency of deficiencies by the number of chances for deficiencies. The evaluation process begins with asking the customers how they evaluate quality. To further clarify the meaning of quality, Juran points out that product satisfaction and dissatisfaction are not opposites. "Product satisfaction has its origin in product features and that is why clients buy the products. Product dissatisfaction has its origin in non-conformance and that is why customers complain."

Fitness for use is achieved by a process which reflects the interplay between the various stages of organizational activities before meeting customer demands and Juran terms this process as "the spiral of progress". The spiral of progress reflects the chain of user- supplier relationships at various stages of the process.

Caution Quality has to be controlled at each stage of the processes but should not be implemented just as a mechanical process.

It should be aimed at controlling two aspects.

- Sporadic problems or avoidable costs (defects, product failure, scrapped materials, labor wasted in usage for rework, repair, dealing with customer complaints).
- Unavoidable costs dealing with chronic problems (prevention and control).

The first category of the problems is easily solved by using quality control techniques such as tolerance review, fool proofing, standard statistical techniques, charts and diagrams. The second category, however, requires the introduction of a new culture which is intended to change attitudes and increase companywide knowledge. The long-term health of business is determined by a structured approach to quality which is planned, implemented and controlled according to the mission of the business concerned.

2.3.2 Juran's Quality Trilogy

Juran proposes three managerial processes under his Quality Trilogy which he thinks are necessary for the structured implementation of a total quality program. These three managerial processes are: (i) Planning, (ii) Improvement and (iii) control. Juran argues that the planning process is crucial for improvement to become a continuous activity. Planning therefore, has to be conducted with a long-term view rather than a on a project by project basis.

Juran's project by project improvement approach is very popular among Indian companies as well.

Notes

Example: Punjab Tractors Limited, Mohali (Punjab) has started implementing this approach for improving its overall effectiveness. They have achieved very encouraging results with the help of this approach.

Many more Indian companies have started using Juran's project by project improvement approach in their plants for improving effectiveness. But ultimately they have to drain the swamp, that is, implement total quality management.

Juran developed a quality trilogy to assist management in the implementation of strategic quality planning.

Juran, trilogy comprises the three stages of quality planning, quality control and quality improvement. Juran suggested that most organizations placed too much emphasis on control and paid insufficient attention to the aspects of planning and improvement. The seven management tools support the quality planning process in assisting the identification and management of quality improvement opportunity. In terms of improvement process, Juran proposed a six-stage methodology.

Table 2.1: Juran's Trilogy

Quality Planning	Quality Control	Quality Improvement
• Identify the customers. • Determine the customer's needs. • Develop product features. • Establish quality goods. • Develop a process. • Prove process capability	• Choose control subjects • Choose units of measurement • Establish measurement • Establish standards of performance • Measure actual performance • Interpret the difference • Take action on the difference	• Prove need for improvement • Identify specific projects for improvement • Guide the projects • Diagnose for discovery of causes • Diagnose to find the causes • Provide remedies • Prove that remedies are effective under the operating conditions • Provide for control to hold gains.

2.3.3 Juran's Six Stage Methodology

1. ***Proof of Need:*** To establish the economic benefit associated with quality improvement.
2. ***Project Identification:*** To establish and distinguish the critical few from the trivial many improvement projects which may be undertaken for improvement.
3. ***Organization for Breakthrough:*** The establishment of the project-management and teamwork.
4. ***The Diagnostic Journey:*** The use of problem solving tool s to unravel the problem and identify the root causes of the problem.
5. ***The Remedial Journey:*** The selection of optional improvement proposal and effective implementation.
6. ***Holding the Gains:*** Ensuring the new methods and procedures are established and the breakthrough in performance is maintained.

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2.3.4 Juran's 10 Steps of Quality Improvement

Juran's quality improvement process is oftentimes summarized in a ten step process given in table below:

Table 2.2: 10 Steps of Quality Improvement

SI.No.	Steps
1.	Build awareness of the need and opportunity for improvement
2.	Set goats for improvement
3.	Organise to reach the goals (e.g. establish a quality council, identify problems, select processes that need improvement, appoint teams, train facilitators and team members)
4.	Provide training throughout the organisation.
5.	Carryout projects to solve problems.
6.	Report progress
7.	Give recognition
8.	Communicate results
9.	Keep score
10.	Maintain momentum by making actual improvement part of the regular systems and processes of the company.

Self Assessment

Fill in the blanks:

12. Juran was a/an ……. by profession working in the USA.
13. Juran defines quality as…… .
14. The spiral of progress reflects the chain of ……. relationships at various stages of the process.
15. Juran's …… improvement approach is very popular among Indian companies as well.
16. Juran developed a …… to assist management in the implementation of strategic quality planning.

2.4 Philip B. Crosby

Philip B. Crosby was a former Corporate Vice-President for Quality at ITT. He is the founder of the Crosby Quality College where over 15,000 senior managers have attended courses and seminars on quality. Crosby is perhaps best known for his more vocational style and popular programs such as: zero defects (ZD), conformance to requirements and quality is free. He is also the author of many books amongst which Quality is Free–The Art of Making Quality Certain is a universally adopted books. His one other book is: "Quality without tears".

The essence of Crosby's quality drive is prevention. He argues that quality should be Zero Defect (ZD). Acceptable Quality Levels (AQL) should be forbidden because they compromise the commitment towards the achievement of Zero Defects. According to Crosby there are two major problems which are the causes of poor quality in industry.

(i) Those which are due to employee's poor awareness and knowledge, and

Notes

(ii) Others which are due to carelessness and lack of attention. The former can be easily identified, measured, and solved but the latter need long term management effort in changing culture and attitudes.

Crosby explains that if managements are serious about achieving ZD, they have to be serious about prevention. He proposes some guidelines for managers which he calls the four absolutes of quality management. He has also put forward a 14-point program for quality management. Crosby refers to the four absolutes of quality management as: "The concept that forms the foundation for improvement". They must be ingrained in the mind and fabric of an organization. These must also be implemented continually if success is to be complete and permanent.

2.4.1 Crosby's Four Absolutes of Quality

1. ***Quality Means Conformance to Requirements:*** The setting of requirements is management's responsibility as are the communication devices and their effectiveness. Crosby argues that if management wants people to "do things right the first time", they have to tell everyone clearly what that is.
2. ***Quality Comes from Prevention:*** Vaccination is the way to prevent disease. The first absolute was to understand the process by which various processes are involved in producing products/services. The second is about identifying and eliminating all chances of error to occur. Appraisal and inspections are expensive and unreliable methods of attaining quality. Organizations have to adopt prevention as the way of life as Crosby notes, "The error that does not exist cannot be missed." The secret to prevention is: observing the process, identifying possibilities for error, and eliminating the causes of problem. His observation concerning service and manufacturing organizations is: "The only difference between the two is that the waste in service companies goes out in baskets and in manufacturing companies in barrels."
3. ***Quality Performance Standard is Zero Defects:*** "This is conformance to requirements and should be the personal performance standard of everyone in the organization, and will come from a change in attitudes" according to Crosby. Crosby believes errors are a function of the importance the organization and individual place on specific things. People will perform the standard they are given if they truly understand it. And that the standard must be zero defect.
4. ***Quality Measurement is the Price of Non-conformance:*** According to Crosby manufacturing companies spend 25 percent of sales doing things wrong and service companies spend about 40 percent of their operating costs on the same wasteful actions. Crosby explains that cost of quality consists of two areas of performances: Price of non-conformance and price of conformance. The price of non-conformance is all the expenses involved doing things wrong. The price of conformance is what is spent to make things come out right Tracking this data serves to act as a way to determine where promising improvement opportunities lie and a way to track the improvement.

Similarly to the arguments raised by Deming and Juran, Crosby thinks that companies' performance is reflected by their management attitudes to quality. To achieve great improvements, management has to believe in the following points:

- The conviction by senior managers that they have had enough of quality being a problem and wanting to turn it into an asset.
- The commitment that they will understand and implement the four absolutes of quality management.
- The conversion to that way of thinking from the conventional wisdom that caused the problem in the first place.

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7Crosby points out that it takes a long time to transfer from conviction to conversion but that as soon as the transfer process begins it is a positive sign that improvement starts to take place.

2.4.2 Crosby's Six C's

A Key to the improvement process is education beginning with management and flowing down to all employees. Crosby summarizes the education process in the six C's as follows:

1. ***Comprehension:*** Understanding what is necessary and the abandonment of the conventional way of thinking.
2. ***Commitment:*** Expression of dedication first by management and everyone else soon after.
3. ***Competence:*** Implementation of the improvement process in a methodical way.
4. ***Correction:*** Elimination of possibilities for error by identifying current problems and tracking them back to their basic cause.
5. ***Communication:*** Complete understanding and support of all people in the process including suppliers and customers.
6. ***Continuance:*** Unyielding remembrance of how things used to be and how they are going to be.

2.4.3 Crosby's 14 Steps of Quality Improvement Plan

Crosby has put forward 14 steps plan for quality improvement. This plan includes steps which are to be taken simultaneously or in parallel. The first six steps in the sequence are performed by management and need to be done first. Crosby's 14 steps for quality improvement are given below:

1. ***Management Commitment:*** Three actions are recommended to help management recognize that it must be personally committed to participation in quality improvement program;
   i. A corporate policy on quality needs to be issued clarifying the commitment (e.g. we will deliver defect-free products and services to our clients, on time)
   ii. Quality becomes the first agenda item at regular management status meetings.
   iii. Senior management needs to compose clear quality speeches in their minds and deliver them.
2. ***Quality Improvement Teams:*** This envisages bringing together representatives of each department to form such a team and help it succeed. Crosby states: "The team has to understand that we are after a change in the attitudes and practices of the supervisors of the company, not of the troops. Their turn will come."
3. ***Quality Measurement:*** We should determine the quality status throughout the company. Measures are essential if the team and organization are to know how they are doing and where corrective action is required. Measures must be developed carefully.
4. ***Cost of Quality Evaluation:*** We should establish the cost of quality to indicate where corrective action will be profitable for a company. This development of a cost of quality measurement (as outlined in the fourth absolute of quality) is essential to the processes. It is critical that the cost of quality be developed in a formal and objective way to serve as a stimulus for the quality improvement process.
5. ***Quality Awareness:*** We must share with employees the measurements of whose non-quality is costing through training and communication. Communication that creates awareness of

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what is important and what is happening, must take place. Internal methods must be utilized and improved and developed. A consistent message must be presented. One critical component is making sure that the employees are aware of management's commitment.

6. ***Corrective Action:*** We must bring problems to light for all to see and resolve them on a regular basis. The purpose is to identify and eliminate problems forever. A corrective action system needs to be based on analysis that identifies the root cause of the problem and it can be eliminated.

7. ***Zero Defect Day Planning:*** We should establish an ad hoc committee for implanting zero defect programs. We should also plan to celebrate quality achievements and the quality management process. The key is to understanding when to take this step. Crosby notes that there is probably no need to plan the day sooner than a year and a half into the process.

8. ***Employee Education:*** There is a need for a formal orientation of the zero defect program with all levels of management prior to its implementation. Once management understands the four absolutes of quality and is practicing them. It is time to educate all employees of the company. Rather than training department putting the program together and delivering it. Crosby recommends the use of a special 30 hours quality training program that provides a standard message and could be seen by anyone trained on the package.

9. ***Zero Defect Day:*** Zero defect as the performance standard of the company is to be established in one day to provide emphasis and long lasting impression. The purpose of this is to get management to make their commitment to quality in a public day so that they will abide by it. Management must show that they are serious about quality.

10. ***Goal Setting:*** Regular meetings between superiors and employees help people learn to think in terms of meeting goals and accomplishing specific tasks as a team. Goal setting is initiated immediately after measurement.

11. ***Removal of Causes of Error:*** Individuals are asked to describe any problem that may distance them from performing error free work. The appropriate functional group will develop an answer to those problems. Crosby describes this step as, "Asking people to state the problem they have so that something can be done about it." This is not the time for suggestions but a time to identify the problems and their causes.

12. ***Recognition:*** Award programs must be established to recognize those who meet their goals or perform outstanding acts.

Caution Awards should not be financial. Recognition is what is important.

This is an essential step in quality improvement process. Crosby warns that companies should not rush into recognition. It should be well thought out and performed at all levels. He recommends strongly against using money: 'It is just not personal enough."

13. ***Quality Councils:*** Quality professionals and chairpersons should meet regularly to communicate and determine actions to upgrade and improve the quality improvement program. The intent of the quality councils is to bring quality experts in the organization together to learn from one another and support the process.

14. ***Do it all Over Again:*** Management must set up a new team of representatives and begin again to overcome the turnover and change situations that can take a year to 18 months to implement the typical quality improvement program. The current quality team or a new quality team can start the process over again to provide for ongoing improvement.

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"Managements have their future in their own hands. It is not the laws of probability or statistics that have kept them down, it is their own policy that's good enough". The Crosby approach to total quality to change the culture and attitudes within organizations to implement continuous improvement is therefore more managements-oriented not tool-oriented since it does refer at all to the control the quality by the use of various statistical tools. Crosby's contribution is a ready reckoner on total quality for managers of all sorts of future organizations.

Self Assessment

Fill in the blanks:

17. Philip B. Crosby was a former ……. for Quality at ITT.
18. The essence of Crosby's quality drive is…… .
19. …….. methods must be utilized and improved and developed.
20. A …….. system needs to be based on analysis that identifies the root cause of the problem and it can be eliminated.
21. Awards should not be…….. .

2.5 Armand v. Feigenbaum

Armand V. Feigenbaum became known to the Japanese at the same time as Deming and Juran. As head of quality at General Electric (USA) he had extensive contacts with Japanese companies such as Hitachi and Toshiba. But it is really through his book titled: Total Quality Control that he became best known. He was the first to argue that quality should be considered at all the various stages of the process and not just within the manufacturing function. Feigenbaum argued that the contribution of the manufacturing function in isolation is not enough for the production of high quality products. He concludes:

"The underlying principle of the total quality view and its basic difference from all other concepts is that to provide genuine effectiveness. Control must start with identification of customer quality requirements and end only when the product has been placed in the hands of a customer who remains satisfied. Total Quality Control guides the coordinated actions of people, machines, and information to achieve this goal. The first principle to recognize is that quality is everybody's job."

From a quality consideration, Feigenbaum argues that new products progress in the factory through smaller stages of what he terms the industrial cycle. He refers to three categories of stages of the industrial cycle.

2.5.1 Stages of Industrial Cycle

1. New design control
2. Incoming material control
3. Product or shop-floor control

He also made a major contribution by studying quality costs. He identified the various costs in what he called the 'hidden plant'. This is the proportion of the total plant capacity which specifically deals with rework and corrections. He considered that the size of the hidden plant can vary from 15 to 40 per cent of the total plant capacity.

Deming, Juran and Crosby are the main pioneers in the area of Total Quality management. Their thoughts on TQM have some conflicts but there are more similarities than conflicts. So their contributions to TQM are also regarded as three paths, one journey.

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Task Present a detailed report highlighting the clashes and commonalties in the philosophies of W. Edwards Deming, Philip B. Crosby and Joseph M. Juran.

Self Assessment

Fill in the blanks:

22. ……. was the first to argue that quality should be considered at all the various stages of the process and not just within the manufacturing function.
23. The underlying principle of the total quality view and its basic difference from all other concepts is that to provide……. .

2.6 Bill Conway

Bill Conway has been referred to as the Deming's disciple. He considers that quality management is the management of the various stages of the development, manufacturing, purchasing and distribution processes with consideration of economic viability and a desire to improve on various activities to reduce material waste and time wastage.

He considers that quality problems are often caused by management's lack of conviction of commitment. Quality improvement according to Conway has to come from a new way of management thinking and also the wide utilization of statistical tools. He proposes a list of six guidelines as shown below.

2.6.1 Conway's Quality Improvement Tools

(a) ***Human Relation Skills:*** Management responsibility is to create a harmonious working climate built on trust, mutual respect and common goals.

(b) ***Statistical Surveys:*** Use the power of surveys to identify areas for improvement and to be better informed about various developments.

(c) ***Simple vs. Statistical Techniques:*** Use simple charts, diagrams to highlight problems, analyze them and propose various solutions.

(d) ***Statistical Process Control:*** Minimize variations within various processes using control charts.

(e) ***Imagineering:*** Use of problem solving techniques using problem visualization with a view of identifying ways for waste elimination.

(f) ***Industrial Engineering:*** The use of various techniques to redesign work methods, and plant layout for the purpose of achieving major improvements.

These tools for quality improvement are widely used in industries worldwide. Some forward looking Indian companies also use these tools now.

Self Assessment

Fill in the blanks:

24. …… has been referred to as the Deming's disciple.
25. ……. minimize variations within various processes using control charts.

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2.7 Kaoru Ishikawa

Kaoru Ishikawa is considered as Japan's leading figure in the area of Total Quality Management. His inspiration came from the work of Deming and Juran and to a lesser extent, from that of Feigenbaum. He is more respected for the following contributions.

Ishikawa's main contributions to TQM are given below:

(i) ***Quality control circles:*** He was the first to introduce this concept and to have put it into practice successfully.

(ii) He is the originator of fishbone diagrams or Ishikawa diagrams which are now used worldwide for problem solving and continuous improvement through cause-effect analysis.

(iii) Ishikawa has commented that Feigenbaum's approach to Total Quality Control includes many non-specialists and therefore, the input on quality problem solving may be limited. He argues that Company Wide Quality Control (CWQC) has to rely on the wide use of statistical techniques. He has classified statistical techniques in three categories as given below. Ishikawa argues that nearly 90-95 per cent of the problems can be solved using the elementary statistical techniques which do not require specialized knowledge.

2.7.1 Ishikawa's Statistical Techniques to CWQC

1. Elementary statistical techniques
   - i. Pareto analysis (vital few *versus* trivial many)
   - ii. Cause and effect diagram (not a true statistical technique)
   - iii. Stratification
   - iv. Checklist (tally sheet)
   - v. Histogram
   - vi. Scatter diagram
   - vii. Graphs and Shewhart control chart
2. Intermediate statistical methods
   - i. Theory of sampling surveys
   - ii. Statistical sampling techniques
   - iii. Various methods of statistical estimation and hypothesis testing
   - iv. Methods of utilizing sensory tests
   - v. Methods of experimental design
3. Advanced statistical methods (using computers)
   - i. Advanced experimental design
   - ii. Multivariate analysis
   - iii. Operations research methods.

Self Assessment

Fill in the blanks:

26. …….. was the first to introduce the concept of quality control circles.

27. Kaoru Ishikawa argues that …….. has to rely on the wide use of statistical techniques.

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2.8 Genichi Taguchi

Genichi Taguchi worked as Director of the Japanese Academy of Quality between 1978-82. He was awarded the Deming Prize in 1960 for his contribution in developing techniques for industrial optimization. He has developed methods for on-line and off-line quality control which form the basis for his approach towards total quality control assurance in 1989. Taguchi received MITI's Pourle Ribbon Award from the Emperor of Japan for his contribution to Japanese industrial standards. He is known as international consultant in quality control and assurance.

Taguchi's methods incorporate the use of statistical techniques. They are primarily intended for designers and engineers to optimize the setting so that products are robust. These statistical methods are intended as a troubleshooting/problem-solving tool in the early stages of the product development cycle. Besides control variables which are dealt with by SPC, Taguchi methods enable engineers/designers to identify 'noise variables' which if not controlled can affect product manufacture and performance.

Taguchi defines the quality of a product as the loss imparted by the product to the society from the time the products is shipped. The loss may include various things such as customer complaints, added warranty costs, damage to company reputation and loss of market lead amongst others.

Taguchi argues that product does not start causing losses until it is out of specification but more importantly when there is deviation from the target value.

Taguchi methods emerged because of his disagreement with the use of zero defect as a principle to produce quality products. The zero defect principle is that the robustness derives from consistency. Provided that there is a consistency in deviations, it will be quite possible to make adjustments in the target. Zero Defect does not permit scattered deviations within specifications.

Taguchi argues that product robustness comes from having consistent deviation which them makes the task of elimination much easier. He proposed the list of quality imperatives as guidelines to quality improvement.

Table 2.3: Taguchi's Quality Imperatives

SI.No.	Quality imperatives
1.	Quality losses result from product failure after sale. Product robustness is more a function of product design than on-line control, however, stringent be the manufacturing processes.
2.	Robust products deliver a strong signal regardless of external noise and with a minimum of internal 'noises'. Any strengthening of a design, that is any market increase in the signal-to-noise ratios of component parts will simultaneously improve the robustness of the product as a whole.
3.	To set targets at maximum signal-to-noise ratios, develop a system of trails that allows you to analyse change in overall system performance according to the average effect of change in component parts that is when you subject parts of varying values, stresses and experimental conditions. In new products, average effects may be most efficiently discemed by means of "orthogonal arrays".
4.	To build robust products, set ideal target values for components and then minimize the average of the square of deviations for combined components , averaged over the various customer-user conditions.
5.	Before products go on to manufacturing tolerances are set. Overall quality loss then increases by the square of deviation from the target value, that is, by the quadratic, formula $L = D^2C$, where the constant C, is determined by the cost of the counter measure that might be employed in the factory. This is the "quality loss function".
6.	Virtually nothing is gained in shipping a product that just barely satisfied the corporate standards over a product that just fails. Get on target, don't just try to stay in specification.

Contd...

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7.	Work relentlessly to achieve designs that can be product consistently, demand deviation outside. Where deviation from target is consistent, adjustment to the target is possible.
8.	A concerted effort to reduce product failure in the field will simultaneously reduce the number of defectives in the factory. Strive to reduce variances in the components of the product and variance will be reduced in the production system as a whole.
9.	Competing proposal for capital equipment of competing proposals for on-line interventions may be compared by adding the cost of each proposal to the average quality loss that is, the deviations expected from it.

2.8.1 Signal-to-noise (Deviation)

The signal is what the product, part or component is trying to deliver. Noises are what we term 'interferences' which affect the signal. Noises come from two different types of factors which affect the functional characteristics of a product by influencing its performance according to the following set values:

1. Operating environmental variables (external noise factors), e.g. temperature, dust and humidity; and
2. ***Internal noise factors are of two types:*** (a) Deterioration, wear and tear of process parts; and (b) imperfections in process function and variations due to settings.

2.8.2 Orthogonal Arrays

These are the techniques used to set the right targets for design (by maximizing signal-to-noise ratios). They are also described as a distillation mechanism whereby the effect of various factors is identified and measured.

Orthogonal arrays are useful because:

i. They define the specific objective by choosing a realistic signal and giving an estimate of the expected noise;

ii. They define feasible options especially for the critical design values (e.g. dimensions), and

iii. They enable companies to select the product option which provides the highest signal to noise ratio and hence products which have robust characteristics in the market place.

Self Assessment

Fill in the blanks:

28. Taguchi received MITI's …….. from the Emperor of Japan for his contribution to Japanese industrial standards.
29. Taguchi is known as …….. in quality control and assurance.
30. Taguchi methods emerged because of his disagreement with the use of …….. as a principle to produce quality products.

2.9 Shiego Shingo

Shiego Shingo has pioneered the area of Zero Quality Control by asking similar questions as those asked by Taguchi. Shingo argues that the effort put into the tightening tolerances does not necessarily raise production costs significantly as is widely believed.

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Shingo has been teaching concepts of production engineering to many Japanese managers and is still promoting the area of zero quality control by arguing that inspection processes or the use of statistical quality control should be completely eliminated.

He believes that quality should be controlled at the source of the problem not after the problem has manifested itself. Consequently, he recommends that inspection should be incorporated within the process where the problem has been identified and where it should be eliminated. He considers that Statistical Quality Control (SQC) tends to focus on the effect rather than the cause which is due to process imperfections and abnormalities.

He is the developer of a concept called Poka-yoke (or fool proofing).

Poka-Yoke means that checklists for each operation are provided so that human error is completely eliminated. It is also similar to the concept of automation (Jidoka) based on low-cost automated processes which stop automatically when the required operations are completed or when mistakes or abnormalities develop.

Shingo recommends the guidelines as shown below for implementation of Poka-Yoke.

Table 2.4: Guidelines for Implementation of Poka-yoke

Sl. No.	Guidelines
1.	Control upstream goes to the source of problem by incorporating monitoring devices to warn on defects in materials or abnormalities within the process.
2.	Establish control mechanisms to deal with different problems to enable operators to know which problem to cure and how to cure it with minimal disruption to the operating system.
3.	Take a step-by-step approach by looking at small articles, simplifying control system and having economic viability in mind. Efficiency, technological sophistication, available skills, work methods have all got to be carefully studied for effective usage of Poka-yoke.
4.	Do not delay improvement by over analysing. Although many manufacturers' main objective is to achieve closeness between design and manufacturability, yet Poka-yoke ideas can be implemented as soon as the problems have been identified with no cost at all to the companies concerned. Poka-yoke encourage inter- departmental co-operation and is a main vehicle for continuous improvement because it encourages continuous problem solving activity.

Thus zero quality control, Poka-yoke and Jidoka are the major contributions of Shingo which are frequently used by companies for the purpose of TQM implementation.

Self Assessment

Fill in the blanks:

31. ……. is the developer of a concept called Poka-yoke.

32. …….. means that checklists for each operation are provided so that human error is completely eliminated.

2.10 W.G. Ouchi

W.G. Ouchi is famous for his work on "theory Z". He has researched the impact of Japanese management philosophy on American businesses, Ouchi came to the conclusion that the success of Japanese businesses is mainly due to their commitment to quality and their participative style of management.

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Ouchi believes that American businesses treat inefficiencies are mainly because of an acute specialization problem. He concludes: "In the United States we conduct our careers between organizations but with a single specialty. In Japan people conduct careers between specialties but within a single organization."

Table 2.5: Theory Z and the 13 steps for its Implementation

Sl. No.	Guidelines
1.	Understand the type Z organisation and your role.
2.	Audit your company's philosophy
3.	Define the desired management philosophy and involve the company leader
4.	Implement the philosophy by creating both structures and incentives.
5.	Develop inter-personal skills
6.	Test yourself and the system
7.	Involve the union.
8.	Stabilise employment. Avoid layoffs and share the misfortune.
9.	Decide on a system for showing evaluation and promotion.
10.	Broaden career path development.
11.	Prepare for implementation of the first (bottom) level.
12.	Seek out areas to implement participation.
13.	Permit the development of relationship.

Ouchi proposes the guidelines for the implementation of Japanese management philosophy based on high commitment to quality and a participative style of management. There is no doubt that further TQM ideas and concepts will be developed in the future to facilitate meeting the requirements of a business market which is ever changing. The work of the Gurus discussed in this chapter will, however, always have prominence in shaping up future competitiveness.

Self Assessment

Fill in the blanks:

33. W.G. Ouchi is famous for his work on …… .

34. ……. proposes the guidelines for the implementation of Japanese management philosophy based on high commitment to quality and a participative style of management.

2.11 Vilfredo Pareto

Vilfredo Pareto developed Pareto's law at the end of nineteenth century. While studying the concentration of wealth and income in his native country, Italy; Pareto found that a very large percentage of the total national income was concentrated in the hands of about 20 percent of the population. Pareto was an engineer and had mathematical orientation. So his natural inclination led him to express this concentration of income in mathematical terms. Cumulative curves were developed from the income number of persons' curves.

2.11.1 Pareto's Law

For many years this relationship was considered to be an interesting phenomenon with very little practical use. However, shortly before the World War, inventory control experts' analysis

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revealed that when inventory items were plotted on cumulative percentage graphs in order of descending value, Pareto's relationship seemed to emerge. It was observed that 10-20 per cent of items in a given inventory accounted for 80-90 per cent of the total value of the inventory. The remaining large number of items then accounted for a very small portion of the inventory value.

Observations in many years have shown a widespread applicability of Pareto's law.

Example: Only a few children cause problems in school. Only a few people accounted for most absenteeism. Similarly, only a few defects account for most quality losses.

2.11.2 Pareto's Diagram

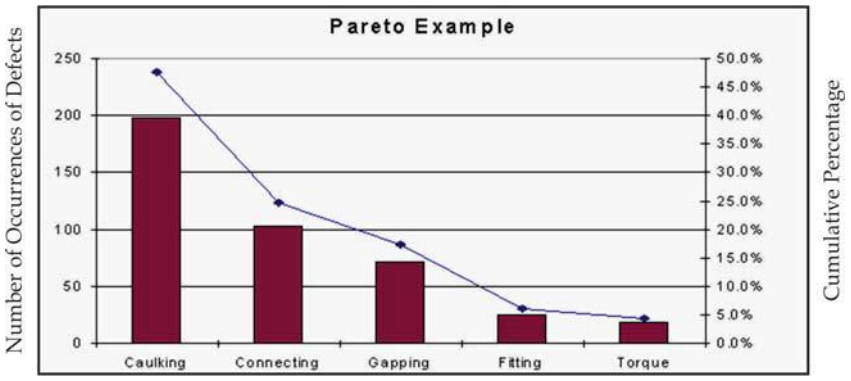
Pareto diagram is a graphical representation of the above law. The various categories are listed across the graph, and then the cumulative totals are plotted as percentage, starting with the largest number to the left. In this way a Pareto diagram is formed.

Example: A Pareto Example

Types of Errers/Defects Discoverred

Defective Items	Number of Defectives	Percent of Defects	Percent Distribution of defectives
Caulking	198	9.15%	47.60%
Connecting	103	4.76%	24.76%
Gapping	72	3.33%	17.31%
Fitting	25	1.15%	6.01%
Torque	18	0.83%	4.33%
Total	416	19.21%	100.00%

Pareto Diagram for the above data is:



Pareto analysis helps in prioritization of problems or areas for improvement. If resources are scarce, it is important that they are directed to where most benefits can be gained.

Thus, Pareto's contributions are very popular and Pareto analysis is very widely used in problem solving in TQM implementation programs.

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2.12 Tom Peters

Tom Peters has studied quality in a number of companies and synthesized contributions to excellence. He has identified two ways of sustaining superior behavior: (1) taking care of the customer via superior service and quality and (2) constant innovation. Peters with Waterman Jr. wrote the popular books: In Search of Excellence. He wrote another book titled: A Passion for excellence with Nancy Austin. In the first book Tom Peters puts forward eight points as the attributes of excellent companies, viz. a bias for action, close to the customer, autonomy and entrepreneurship, productivity through people, hands on value driven, stick to the knittings, simple form lean staff, and simultaneous loose-tight properties. In his second book Tom Peters developed the concept of Management by Wandering Around (MBWA), that is, wandering around with employees, suppliers and customers for attaining excellence.

Tom Peters who was a partner at McKinsey & Co, during the research that led to authoring of In Search of Excellence, left half way through for the writing of this book in 1981. He founded his own companies. Now these companies are called the Tom Peters Group. They include Palo Alto consulting Centre- a Centre for management excellence. This conducts the intensive four-day seminars for top managers (known to alumni as Skunk Group). His publishing company is responsible for audio, video and print products. Tom Peters is known as a 'Guru' on achieving actual excellence in organizations.

2.13 S R Udpa

SR Udpa is the founder Executive Director of Quality Circle Forum of India (QCFI). It was with efforts and initiation of Mr. S.R. Udpa that in November 1980 a few quality circles were formed in Bharat Heavy Electrical Limited, Hyderabad,

Mr. Udpa was General Manager (Operations) of BHEL at that time. Under the guidance and missionary zeal of Mr. Udpa, since 1982, QCFI propagated the participative concept throughout India. Mr. Udpa conducted several "in-house" and "institutional" training programs on quality circle implementation in our milieu. Today a large number of organizations in the country have operationalized quality circles for implementing TQM. QCFI also publishes its quarterly journal along with other popular publications. Mr. Udpa on the basis of his experiences has written a book titled: Quality Circles Progress through participation which provides directions and guidance for quality circle formation and operations in various Indian organizations.

Self Assessment

Fill in the blanks:

35. ……. helps in prioritization of problems or areas for improvement.
36. ……. has studied quality in a number of companies and synthesized contributions to excellence.
37. In his second book Tom Peters developed the concept of …….. .
38. Tom Peters is known as a 'Guru' on achieving …….. in organizations.
39. …….. is the founder Executive Director of Quality Circle Forum of India.

Notes

Case Study

The Historic Story of how Sundaram-Clayton Beat the World to Win the Deming Prize

They are the demigods. From the mud has sprung the lotus. From the quagmire of quality that India Inc. has become has emerged a flagbearer of global class. From the disdain for Total Quality Management (TQM) has come forth India's – and Asia's – first-ever winner of the Deming Prize for Overseas Companies: Sundaram-Clayton, the Chennai-based manufacturer of air-brake systems and castings, every rupee of whose turnover of ₹ 139.37 crore now carries the watermark of quality that is world-class, organization-wide, and fault-proof. In short, unbeatable.

For, the Deming Prize is, quite simply, the last word in the world on quality. Instituted by the country that gave quality to the world – Japan – to honour the man who gave quality to the world, W. Edwards Deming, it is an acknowledgement of the fact that Sundaram-Clayton, led by its CEO Venu Srinivasan, 45, has risen above the countrywide contempt for total quality to be counted up there among an exclusively small global elite.

So small that it consists of only three other companies: the $6.51-billion Florida Power & Light, which won the Deming Prize in 1989; the $53.26-billion AT&T's Power Systems Division in 1994, and the $38.05-billion Philips' Taiwan unit.

So small that even the great TQM corporations of the world, like the $48.88-billion Honda, the $55.03-billion Sony, and the $190.84-billion General Electric, do not belong to it.

So small that, in the 38 long years since the Deming Prize was instituted – and the 15 years since a separate Prize was offered to companies outside Japan – for 5 different categories, only 163 CEOs and managers have ever strode up to receive the coveted medal on the dais at the Union of Japanese Scientists & Engineers' (a.k.a. JUSE) Centre Hall in downtown Tokyo.

When Srinivasan joined their ranks on November 14, 1998 – tellingly, Children's Day – it was a small step for him to the podium, but a truly giant step for India Inc. What makes Sundaram-Clayton's winning the Deming Prize for total quality – Company-Wide Quality Control (or CWQC, in JUSE-speak) – an extraordinary feat is the fact that no global award for quality makes more demands of both the body and the soul of the winning corporation. The Malcolm Baldrige Award for quality in the US is comprehensive in its coverage of quality-related parameters too, but even its ruthless objectiveness excludes the fanatical obsession with statistical quality-control and performance that the Deming Prize displays. The European Quality Model Award is ingenious in its linkage of the enablers and results of quality, but cannot match the depth of the Deming Prize's probes. For, there is no transaction, no speck of dust on the floor, no tightening of a nut, no disaffected worker that escapes the scrutiny of the examination team.

In fact, the JUSE's rigorous quality audit tests a company on not 2 or 3, but 10 parameters which, between them, envelop each and every activity of a company. The one relentless theme that is tested across every operation: the ability of a company to use statistics-driven quality-control mechanisms to produce – consistently, economically, and reliably – a product or service that meets the customer's requirement in every possible manner – not just once, not just sporadically, not just over a specified period, but time after time after time after time. Explains Suresh Krishna, 61, the CEO of the ₹ 326.18-crore Sundram Fasteners, and a fellow-traveller on the road to total quality: "The Deming Prize

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is not just a recognition of product quality. It is recognition of the organization itself. Clearly, Sundaram-Clayton meets the requirements of a world-class company."

Ask a Deming Prize winner, though, and he will say – not from the public pulpit, but as a statement of his intensely personal religion – that quality is a journey, not a destination. That's why Sundaram-Clayton will never rest on its laurels. Says CEO Srinivasan, a man whose energy is only matched by the intensity of his compulsive pursuit of excellence: "Internally, we are pleased. But everybody recognizes that we have a long way to go before we become world-class manufacturers." Those, of course, are words of wisdom, gleaned from the teaching of Sundaram-Clayton's Japanese gurus, the JUSE's Yoshikasu Tsuda and the late Y. Washio, who brought Buddha and best-in-class in equal proportions into the company. Argues Ashish Basu, 34, COO, Institute of Quality Ltd (IQL): "The Deming Prize is a good energiser, but it should not be the end-all goal." At Sundaram-Clayton, there are no fears of that happening.

Its climb to the top of TQM started way back in 1979, when Srinivasan took over from his father, T.S. Srinivasan, as CEO after his return from Purdue University (US) in 1977, after his MBA. The SWOT analysis he conducted, applying his B-school learning, revealed, to the company's horror, that a 90-per cent market share was no insulation against top-class competition. Concluding that short-term tactics or defensive strategies would not deliver what a long-term transition to excellence could, Srinivasan set his company off on Quality Street.

In quick succession, Sundaram-Clayton's managers were exposed to the quality practices of global leaders, trained in modern manufacturing techniques, and taught about TQC, first by Yoshio Kondo in a watershed workshop at the National Institute for Quality & Reliability in 1986, and, from 1989 onwards, under the tutelage of Washio and Tsuda. And to walk the talk, Srinivasan set up a core taskforce to baptise Sundaram-Clayton in the new religion of TQC. Recalls quality consultant C.S. Nath, 62, the former general manager (quality) at Sundaram-Clayton: "Srinivasan laid the foundation for TQC in just a few years. When I look back, I am amazed at how focused he has been."

That wasn't all. To provide a big bang bull's eye to aim for – a magnet for the quality practices, as it were – he decided to set external targets, starting with the national quality awards. Sweeping those was easy given Sundaram-Clayton's head-start and commitment: in 1989, for instance, it won the Confederation of Indian Industry's (CII) Quality Circle award, followed by the Quality Circle Federation of India awards in the following years. Despite this raising of the bar, it was evident to Srinivasan that continuous quality improvement had been hardwired into the organisation by the 1990s. And, as it often happens even with the best of companies, the movement faced the threat of petering out if not kept up relentlessly. Concurs S.D. Kulkarni, 64, the CEO of the ₹ 5,841 crore Larsen & Toubro: "In the early years, quality goes through pockets of excellence, but it must be translated into a culture that touches every employee. The vision and momentum must not be lost." So, in 1995, Srinivasan threw a huge challenge to his team: beat the world by winning the Deming Prize. The organizational sub-conscious had been aware that its objective was world-class quality – and the Deming Prize was whispered about in the gangways of the shop floor – but it now became a focused goal. Points out Suresh Lulla, 54, CEO, Qimpro Consultants: "Such goals help inculcate a sense of pride and purposefulness in people."

The results of Sundaram-Clayton's total quality movement are written not just on the medal that was put around Srinivasan's neck, but also on the company's books. Its financial indicators in the 5 years between 1992-93 and 1997-98 tell a tale of top-level performances. Being a vendor to the auto-makers, its top line, of course, is tied to those of its customers: the ₹ 2,048 crore Ashok Leyland and the ₹ 7,450 crore Tata Engineering & Locomotives Co. for air-brake systems, and the ₹ 7,842 crore Maruti Udyog and Hyundai Motors India for

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castings. Thus, sales grew at an average rate of 35 per cent per annum between 1992-93 and 1996-97 although it shrank by 25 per cent in 1997-98 on account of the recession in the automobile industry. Likewise, the average growth in net profits in those 4 years was a stunning 83 per cent per annum – a glowing tribute to quality-led cost management – although it fell back by 35 per cent in 1997-98. But, internally, its performance improved consistently despite the recession, with turnover per employee rising by an average of 18 per cent a year, and gross value added climbing by an average of 12 per cent per annum.

Make no mistake, merely working towards an award – and developing the requisite mindset of competitiveness – is not enough. What Sundaram-Clayton's progress reveals is the all-important alignment of the quality imperatives of the company with the parameters used by an assessment framework, such as the one applied by the JUSE for the Deming Prize. The Deming Prize Committee defines quality as "a system of activities to ensure the quality of products and services, in which products and services of the quality required by customers are produced and delivered economically." Sundaram-Clayton's quality coup: integrating Deming's 10 parameters into the four streams of its quality practices, which flow around policies, people, processes, and products, respectively. Its TQC model puts employees at the base of the pyramid, daily management on top of it, and erects five pillars resting on these two: Total Employee Involvement, Policy Deployment, Standardisation, Kaizen, and Training. In short, everyone everywhere in the company is a custodian of quality. Says IQL's Basu: "Most companies, when they have set a quality goal, will sub-contract the monitoring to the quality department. But that's not what Deming Prize winners do." BT offers a guided tour through today's Deming Prize winner's systems for tomorrow's Deming Prize aspirants.

TQM and Policy

The TQM Corporation ensures that quality is everyone's job for every moment that they are on the job. But only the Deming company articulates this ownership as a policy. Nor is the policy limited to ownership; every activity in the company must conform to the master-list of guidelines on quality. Sundaram-Clayton's strategy: it uses its policy to dovetail the Deming definition of what quality means into the requirement for involving everyone in it. Explains Srinivasan: "Quality is a multi-faceted body. It has to encompass the entire organisation." In fact, Sundaram-Clayton actually has a Quality Policy room, where the company's top managers meet once a week for a review.

At Sundaram-Clayton, the Quality Policy exists in the form of an elaborate statement, which reads: "Sundaram-Clayton will deliver a level of quality that totally meets customer expectations. This customer satisfaction will be obtained by supplying products of the right quality, at the right time, and at the right place. Total employee involvement and continuous improvement in every sphere of activity will be the twin supports on which Sundaram-Clayton quality will stand." Thus, policy deployment spreads across the entire organizational value-chain, including marketing, operations, product development, finance, and personnel. That is especially crucial in the context of the Deming Prize, which grades the performance of every department and function separately – including the CEO himself. Explains Sarita Nagpal, 44, TQM Counsellor, CII: "At Sundaram-Clayton, transformation is truly everybody's job – just as Deming wanted it to be." Adds C. Narasimhan, 58, President, Sundaram-Clayton: "It is the clarity about the company's strategic position in its industry and its long-term goals that has enabled the organization to align itself with the larger objective of becoming a world-class manufacturer."

Questions

1. Explain why winning the Deming Prize is considered prestigious for an Indian organization.

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2. Explain the factors that led to winning the Deming Prize by Sundaram Layton.
3. Explain the quality policy of Sundaram Clayton.
4. Explain how Company Wide Quality Control (CWQC) was practiced at Sundaram Clayton.

Source: *http://www.india-today.com/btoday/22111998/cover.html*

2.14 Summary

- A TQM Guru is an expert thinker who communicates his thoughts through verbal and written expressions and thus contributes to the field of TQM.
- Dr. W. Edwards Deming was awarded his doctorate in mathematical physics in 1928.
- Despite success stories of Xerox, Motorola and many other companies that embraced his teachings, Deming felt he was a prophet without honor in his own country.
- After the World War II, Deming was invited by Japan as an Adviser to the Japanese Census. He became involved with the Japanese Union of Scientists and Engineers (JUSE) after its formation in 1946.
- In 1951, Japan instituted the much-cherished Deming Prize for corporate quality in the honor of Dr. Deming. In 1956 only, Deming was awarded the Shewhart Medal by the American Society for Quality Control.
- Deming stressed the importance of what he calls intrinsic motivation rather than extrinsic motivation.
- Deming's fourteen points can be seen as the ingredients which organizations require to carry out the total transformation that is based on company-wide quality improvement philosophy.
- Deming is perhaps the most respected TQM Guru with a tireless dedication and commitment to help businesses worldwide implement quality improvement concepts and techniques.
- Juran's work started later than Deming after the World War II during rebuilding of Japanese economy.
- He was awarded the Second Order of Sacred Treasure by the Emperor of Japan, the highest decoration given to a non-Japanese citizen for helping the development of quality control in Japan.
- Juran has said that one of the chief obstacles to achieving is disagreement over the meaning of quality and the key words associated with it.
- Quality according to Juran has to be controlled at each stage of the processes but should not be implemented just as a mechanical process.
- The long-term health of business is determined by a structured approach to quality which is planned, implemented and controlled according to the mission of the business concerned.
- Juran's project by project improvement approach is very popular among Indian companies as well.
- Juran developed a quality trilogy to assist management in the implementation of strategic quality planning which comprises of quality planning, quality control and quality improvement.
- Philip B. Crosby was a former Corporate Vice-President for Quality at ITT.

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- The essence of Crosby's quality drive is prevention.
- Crosby has put forward 14 steps plan for quality improvement. This plan includes steps which are to be taken simultaneously or in parallel. The first six steps in the sequence are performed by management and need to be done first.
- Feigenbaum argued that the contribution of the manufacturing function in isolation is not enough for the production of high quality products.
- Bill Conway considers that quality management is the management of the various stages of the development, manufacturing, purchasing and distribution processes with consideration of economic viability and a desire to improve on various activities to reduce material waste and time wastage.
- Kaoru Ishikawa is considered as Japan's leading figure in the area of Total Quality Management.
- Genichi Taguchi worked as Director of the Japanese Academy of Quality between 1978-82. He was awarded the Deming Prize in 1960 for his contribution in developing techniques for industrial optimization.
- Taguchi's methods incorporate the use of statistical techniques.
- Taguchi argues that product does not start causing losses until it is out of specification but more importantly when there is deviation from the target value.
- Orthogonal Arrays are the techniques used to set the right targets for design.
- Shiego Shingo has pioneered the area of Zero Quality Control and is the developer of a concept called Poka-yoke.
- W.G. Ouchi is famous for his work on "theory Z".
- Ouchi believes that American businesses treat inefficiencies are mainly because of an acute specialization problem.
- Vilfredo Pareto developed Pareto's law at the end of nineteenth century. It helps in prioritization of problems or areas for improvement.
- Management by Wandering around was developed by Tom Peters.
- SR Udpa is the founder Executive Director of Quality Circle Forum of India (QCFI).

2.15 Keywords

American Society for Quality Control: ASQC, is the leading quality improvement organization in the United States, with more than 130,000 individual and 1,000 sustaining members worldwide.

Behavioral science: A scientific discipline, such as sociology, anthropology, or psychology, in which the actions and reactions of humans and animals are studied through observational and experimental methods.

Company Wide Quality Control: methodological principles and intervention techniques for step-by-step improvement.

Japanese Union of Scientists and Engineers: JUSE was established in May 1946 and authorized as the foundation of a juridical body by the Science and Technology Agency of Japanese Government.

Jidoka: The term *Jidoka* used in the TPS (Toyota Production System) can be defined as "automation with a human touch".

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Management by Wandering around: A face-to-face communication technique in which a manager walks around a work area and talks informally with employees about issues and concerns.

Management Commitment: Direct participation by the highest level executives in a specific and critically important aspect or program of an organization.

Pareto analysis: It is a decision-making technique that statistically separates a limited number of input factors as having the greatest impact on an outcome, either desirable or undesirable.

Pareto's law: The principle that in most activities a small fraction (around 20%) of the total activity accounts for a large fraction (around 80%) of the result. It is also known as the rule of 80-20.

Piece-rate wage system: A piece-rate wage system is a system where compensation is based upon the number of units of work produced by an individual or distinct work team.

Poka-yoke: It employs visual signals that make mistakes clearly stand out from the rest, or devices that stop an assembly line or process if a part or step is missed.

Quality Control: Quality control is a process that is used to ensure a certain level of quality in a product or service.

Quality Trilogy: Juran's Quality Trilogy consists of quality planning, quality control, and quality improvement.

Theory Z: This theory deals with employee loyalty and the safety of the employees.

Zero Defects: Defect prevention level where all output is within specification limits.

2.16 Review Questions

1. Mention the names of some of the TQM gurus.
2. Why is Deming known as the quality guru who never gave up? Explain his contributions.
3. List down Deming's 14 points.
4. Explain the contribution of Joseph M. Juran with special emphasis on quality trilogy.
5. What are Crosby's 4 absolutes of quality? Explain.
6. Explain the 6 C's of Crosby. Also explain his 14 Steps of Quality Improvement Plan.
7. Discuss in detail Conway's Quality Improvement Tools.
8. List various contributors who have contributed towards the literature of quality improvement. Describe the thoughts of Genichi Taguchi in evaluation of quality, loss function, noise and variation, experimental design and orthogonal arrays.
9. Mention the main contributions of Ishikawa.
10. Explain the zero defect principle of Genichi Taguchi.
11. Explain the contribution of W.G. Ouchi, SR Udpa and Tom Peters.
12. Discuss pareto's law and pareto's diagram.

Answers: Self Assessment

1. TQM Guru
2. Nancy Warren
3. Deming
4. Instability

Notes

5. MacArthur's staff
6. Shewhart Medal
7. utilization of statistics
8. Piece-rate
9. flexibility
10. Short-term
11. Deming prize
12. engineer
13. Fitness to Use
14. user–supplier
15. Project by project
16. Quality trilogy
17. Corporate Vice-President
18. Prevention
19. Internal
20. Corrective action
21. Financial
22. Armand V. Feigenbaum
23. genuine effectiveness
24. Bill Conway
25. Statistical Process Control
26. Kaoru Ishikawa
27. Company Wide Quality Control
28. Pourle Ribbon Award
29. International consultant
30. Zero defect
31. Shiego Shingo
32. Poka-Yoke
33. Theory Z
34. Ouchi
35. Pareto analysis
36. Tom Peters
37. Management by Wandering Around
38. Actual excellence
39. SR Udpa

2.17 Further Readings

Books

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Notes

Unit 3: Concept of Quality Management

CONTENTS

Objectives

Introduction

3.1 Concept of Quality

3.1.1 Dimensions of Quality

3.2 Process Steps in TQM

3.3 The Principles of TQM

3.4 TQM Framework

3.5 Basic Elements of TQM

3.6 Obstacles & Benefits of TQM

3.7 Summary

3.8 Keywords

3.9 Review Questions

3.10 Further Readings

Objectives

After studying this unit, you will be able to:

- Explain the concept of quality
- Discuss the various process steps in TQM
- Explain the principles of TQM and its framework
- Explain the obstacles and benefits of TQM

Introduction

Previous unit gave you an insight on the meaning of total quality management and its development over the years. In this unit, you will study about the TQM framework, its principles and the various obstacles and benefits of TQM.

3.1 Concept of Quality

Quality is defined as meeting or exceeding the needs and expectations of the customer. It is necessary to give customers what they want, but customers may not be willing to pay the price for features that vastly exceed their needs.

Quality can be defined as the degree to which a product is fit for the specific use. It can be defined as products and services beyond present needs and expectations of customers.

Quality is defined as the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs.

'Quality is the ongoing process of building and sustaining relationships by assessing, anticipating, and fulfilling stated and implied needs.'

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The quality of a product is determined by how well it suits one's needs in terms of reliability, durability, safety, maintainability and cost.

3.1.1 Dimensions of Quality

Quality exists in five distinct dimensions. It is made up of experience, measurement, relationships and systems, thinking interconnectivity and paradigm logic and value sharing.

Experience

Quality of a product or service will not exist unless and until it is translated into experience. The ability to translate vision into reality is the primary impact of this dimension. Experience is the translation into reality of the true state of vision of the organization. Further, it provides learning. The successful organization is one that can experiences learn from it.

Measurement

Measurement gives quality the first of its multidimensional characteristics. It provides the ability to, not only assess experience, but also to determine how well or how poorly it was done. This dimension provides the knowledge of the system.

Example: The use of statistical tools such as the check sheet, the Pareto chart, the histogram, the run chart and the control chart.

Relationships and Systems Thinking

Systems thinking transforms a quality system beyond a shallow, two-dimensional system to one that is dynamic, integrated, and leveraged. The ability to see one set of data plotted against another set of data reveals relationships and common threads. It also addresses the impact of interpersonal relationships on trading relationships.

Interconnectivity and Paradigm Logic

The first three dimensions give us the ability to establish a system, as we measure the results of relationships among various parts of the system and make modifications necessary to produce the desired results. However, a system existing only in three dimensions is a closed system. This dimension gives us the ability to look beyond three-dimensional thinking to the interconnectivity of all systems and processes. This gives us the power to understand the paradigm, or set of rules or guiding principles, upon which a system is based. The power of interconnectivity is that it provides a foundation for quantum leaps in quality improvement.

Value Sharing

Value sharing is a universal paradigm that provides a foundation for a complete quality system. An understanding of value sharing gives us the power to measure the strength of relationships. The measure of this strength is in the willingness of participants to consecrate resources to other participants or to a common good.

Value sharing is expressed in the phrase, "Delight the Customer." In other words, "Give the customer more than what the customer is paying for."

As the relationship with the customer grows, there is mutual consecration of resources by both parties as each share the value it derives from trade with the other party.

Notes

Task Choose any company and present an article on how the company has implemented the dimensions of TQM in the organization.

Self Assessment

Fill in the blanks:

1. …… is defined as meeting or exceeding the needs and expectations of the customer.
2. Quality can be defined as the …….. to which a product is fit for the specific use.
3. Quality exists in …… distinct dimensions.
4. …….. is the translation into reality of the true state of vision of the organization.
5. …….. gives quality the first of its multidimensional characteristics.
6. The power of …….. is that it provides a foundation for quantum leaps in quality improvement.
7. ……. is a universal paradigm that provides a foundation for a complete quality system.

3.2 Process Steps in TQM

TQM comprises four process steps, namely:

1. ***Kaizen:*** Focuses on "Continuous Process Improvement", to make processes visible, repeatable and measurable.
2. ***Atarimae Hinshitsu:*** The idea that "things will work as they are supposed to" (for example, a pen will write).
3. ***Kansei:*** Examining the way the user applies the product leads to improvement in the product itself.
4. ***Miryokuteki Hinshitsu:*** The idea that "things should have an aesthetic quality" (for example, a pen will write in a way that is pleasing to the writer).

TQM requires that the company maintain this quality standard in all aspects of its business. This requires ensuring that things are done right the first time and that defects and waste are eliminated from operations.

TQM as a Foundation

TQM is the foundation for activities, which include:

- Meeting Customer Requirements
- Reducing Development Cycle Times
- Just in Time/Demand Flow Manufacturing
- Improvement Teams
- Reducing Product and Service Costs
- Improving Administrative Systems Training

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Caselet

Managers Do Not See Immediate Need to Improve Quality

Like any country that opens its economy, India has in the last 12 years seen much change in the way business and industries as a whole are now dealing with consumer demand and expectation with regard to quality of service, and quality of goods being sold, this is especially evident in the retail and food sectors.

The healthcare sector too has been bitten by the same bug. There has been a slow but sure shift in the way healthcare delivery is being perceived, by both providers and patients. Growing proliferation of the Internet and media vehicles are leading to an awareness about health among people which is fuelling their desire to remain healthy. Patients are demanding better quality of healthcare delivery; this, irrespective of in-patient services, outpatient services or even preventive care.

Yet the one question that remains unanswered is: what is quality in healthcare? How does a provider know they are providing the best quality of care at an affordable price? At the same time, how does a patient/consumer know they are getting value for money when it comes to treatment?

In the US, healthcare practitioners realized, as early as in the 1950s, that managing healthcare is going to be a Herculean task. Who was going to monitor the way treatment was being provided to patients? Who was going to monitor medical malpractice, patient safety, and who was going to translate this into financial costs, not the patient. Hence, there have, over the last few decades, been very significant developments and changes that have been implemented to highlight the quality of healthcare that countries are providing, and how healthcare providers can actually improve and aggressively assure quality in the way they deliver healthcare.

Several theories have been proposed and have been implemented, as to what quality in healthcare pertains to. Yet the easiest and most practical theory was given by Adeis Donabedian, the late quality healthcare guru in the US.

According to him, quality in healthcare encompassed and critical attributes: (1) Structure (2) Process (3) Outcome.

Structure: This pertains to the "physical" aspects of healthcare delivery, including infrastructure, equipment, and human resources, e.g. Equipment requirements as per services being offered and accessibility of facility.

Process: This pertains to the procedures and protocols that all healthcare personnel, clinical and non-clinical have to conform to, so as to ensure appropriate and adequate delivery of healthcare services, e.g. Infection control procedures, protocols for patient case management.

Outcome: This specifically pertains to the well-being of the patient after delivery of healthcare provision, e.g. Mortality rates and case specific morbidity rates.

Taking a more detailed perspective, quality in Healthcare can also be divided into two specific parts: (1) Clinical and (2) Non-clinical Clinical – Looking at the specific clinical aspects that go into delivery of quality healthcare, such as:

1. Clinical credentialing
2. Clinical audit

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3. Clinical risk management (including Infection Control)
4. Clinical outcome measurement
5. Clinical care pathways

Non-clinical – Looking at service quality aspects that go into delivery of Healthcare, such as:

1. Infrastructure and facilities management
2. Equipment management
3. Supplies and consumable management
4. IT Infrastructure and management
5. Hospitality management
6. Patient satisfaction

Apart from this, there are other specific areas such as non-clinical risk management, and accreditation. Why should any healthcare organization think of improving their quality?

As part of the KSA-Technopak "Healthcare Outlook" study, senior managers from the country's top healthcare providers were quizzed over this, with an overwhelming majority saying that "with an occupancy rate of 85-100 per cent, we do not feel there is an immediate need to improve quality; patients come to us because we are already providing good quality services". However, the customer's point of view was a more contrasting picture, as 54 per cent of those surveyed said they were satisfied with the quality of care, 32 per cent stated that services provided were below expectations and 14 per cent stated they were extremely happy with services provided. In the West, implementation of risk management systems in healthcare has lead to the revelation of some startling facts.

Medical errors are one of America's leading causes of death and injury. It is estimated that as many as 44,000 to 98,000 people die in US hospitals each year as the result of medical errors. This means that more people die from medical errors than from motor vehicle accidents, breast cancer, or AIDS. In the UK there are approximately 5,000 deaths/year due to hospital acquired infections (HAI). Hospital admissions up to 7.8 per cent and 15,000 deaths/year are partially attributed to the HAI and cost the NHS approximately 1000 million pounds a year in extended hospital stay and treatment.

In the US, there are approximately 700,000-needle stick injury cases reported per year – 86 per cent of occupational-related infectious disease transmissions result from needle stick injuries. Going by trends in developed healthcare markets, it is imperative that Indian healthcare providers woke up to the need for quality in the delivery of healthcare services, irrespective of the level at which healthcare is provided and the type of services provided.

Sources: Dr Vivek Sahi, *Express Healthcare*

Self Assessment

Fill in the blanks:

8. …… focuses on continuous process improvement.
9. TQM requires that the company maintain its …….. in all aspects of its business.

3.3 The Principles of TQM

The core principles of total quality are:

(i) A focus on the customer

(ii) Participation and team work

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(iii) Employee involvement and empowerment

(iv) Continuous improvement and learning.

Customer Focus

The modern definition of quality centers on meeting or exceeding customer expectations. Thus, the customer is the principle judge of quality. Perceptions of value and satisfaction are influenced by many factors throughout the customer's overall purchase, ownership and service experiences. Companies must focus on all product and service attributes that contribute to perceived value to the customer and lead to customer satisfaction. To accomplish this task, a company's efforts need to extend well beyond merely meeting specifications, reducing defects and errors on eliminating complaints. They must include both designing new products that truly delight the customers and responding rapidly to changing consumer and market demands.

A firm also must recognize that internal customers are as important in assuring quality as are external customers. Employees who view themselves as both customers of and suppliers to other employees understand how their work links to the final product.

Customer focus extends beyond the consumers and internal relationship to the society which represents an important customer of business. Business ethics, public health and safety, environment and the sharing of quality-related information in the company's business and geographic communities are necessary activities of a world-class company.

Participation and Team Work

When managers give employees the tools to make good decisions and the freedom and encouragement to make contributions individually or in teams, they virtually guarantee that better quality products and production processes will result. In any organization the person who performs a job is the person who best understands the job and how to improve both the product and the process. By training employees to think creatively and rewarding good suggestions, managers can develop employee loyalty and trust.

Notes Managers must formulate systems and procedures and put them in places to ensure that participation becomes a part of the work culture.

Participation of employees can be encouraged by implementing suggestion systems or schemes that act quickly, provide feedback and reward good suggestions. These systems should also facilitate the following:

(i) Recognize team and individual accomplishment.

(ii) Share success stories throughout the organization.

(iii) Encourage risk taking by removing the fear of failure.

(iv) Promote the formation of employee involvement teams and

(v) Provide financial and technical support to develop their ideas.

***Team work*:** Team work is another important element of total quality attention on customer – supplier relationships among the employee and encourages the involvement of the total work force in attacking systemic problems, particularly those that cross functional boundaries. Success of team work needs managers' acceptance of workers' suggestions. The "quality circles" implemented in Japan in 1962 achieved dramatic results. Today, the use of self-directed or self-

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managed teams is growing. These teams combine team work and empowerment into a powerful method of "employee involvement".

An important type of team is the cross-function team. This type of team facilitates horizontal coordination between organizational units which is essential for achieving total quality. Partnerships are an additional way of promoting team work. Partnerships between a company and organized labor and between customers and suppliers are useful for practicing total quality.

Did u know? General Motors (GM) tries to eliminate the practice of completing internally and instead promotes team work. To counter internal competition, GM developed a system called "Quality Network" made up of a joint union management, Quality Councils at the corporate, division and plant levels. The heart of the Quality Network is a customer satisfaction model that encourages team work and cooperation.

Employee Involvement and Empowerment

Employee involvement involves changing organizational culture, fostering individual development through training, establishment awards and incentives and encouraging team work.

Employee empowerment means involving employees in every step of the production process. It means enlarging employee jobs so that the added responsibility and authority is moved to the lowest possible in the organization.

Techniques for building employee empowerment include:

(i) Building communication networks that include employees.

(ii) Moving responsibility from managers to production employees.

(iii) Building high employee morale in the organizations and

(iv) Creating such formal organization structures as team and quality circles.

Continuous Improvement and Learning

Caution Continuous improvement and learning should be an integral part of the management of all systems and processes.

Continuous improvement refers to both incremental (i.e. small and gradual) and breakthrough (i.e. large and rapid) improvement.

Improvements may take any one of several forms:

(i) Enhancing value to the customer through new and improved products and services.

(ii) Reducing errors, defects, waste and related costs.

(iii) Improving productivity and effectiveness in the use of all resources.

(iv) Improving responsiveness and cycle time performance.

Learning refers to adapting to change, leading to new goals and approaches. Learning takes place via feedback between practices and results.

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Four stages of a learning cycle are.

(i) Planning

(ii) Execution of plans

(iii) Assessment of progress and

(iv) Revision of plans based upon assessment findings.

Peter Senge, a professor at the MIT. USA, defines the learning organization as "an organization that is continually expanding its capacity to create its future. For such an organization, it is not enough, merely to service. "Survival learning" or what is more often termed "adaptive learning", is important – indeed it is necessary. But for a learning organization, "adaptive learning" must be joined by "generating learning", learning that enhances our capacity to create. Senge often points out, "over the long run, superior performance depend on superior learning".

Example: The plants hold periodic corporate analysis meetings during which entire plants shutdown operations briefly for thorough audits of the quality system. The plant-level work team and workers focus on ways to improve quality and productivity.

Self Assessment

Fill in the blanks:

10. The modern definition of quality centers on meeting or exceeding…… .
11. …… extends beyond the consumers and internal relationship to the society which represents an important customer of business.
12. Managers must formulate …….. and put them in places to ensure that participation becomes a part of the work culture.
13. The heart of the Quality Network is a …… that encourages team work and cooperation.
14. …… means involving employees in every step of the production process.
15. ……. refers to adapting to change, leading to new goals and approaches.

3.4 TQM Framework

It begins with the knowledge provided by gurus of quality: Shewhart, Deming, Juran, Figenbaum, Ishikawa, Crosby and Taguchi. They contributed to the development of principles and practices and/or the tools and techniques. Some of these tools and techniques are used in product and/or service realization activity. Feedback from internal/external customers or interested parties provides information to continually improve the organizations system, product and/or service.

Total Quality Management is a management approach aimed at satisfying all customer requirements, needs and expectations using a Continuous Improvement approach.

The TQM principles can be grouped into the following practical and common sense concepts:

- Customer focus (internal and external customers).
- Leadership (management role changes to active leadership).
- Teamwork (multi-disciplinary teams, including involvement of customers and suppliers).
- Continuous improvement of processes.

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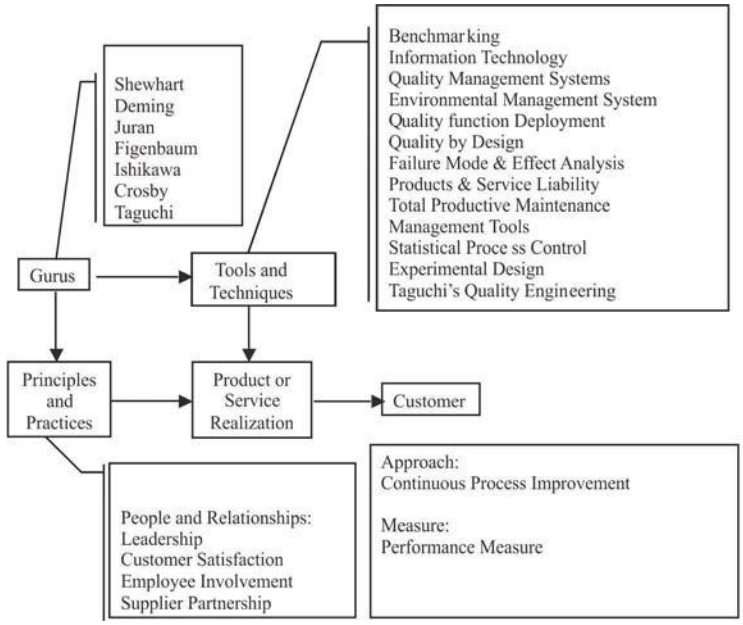
Figure 3.1: TQM Framework



- Measurement (the improvement process is based on quantitative and qualitative metrics).
- Benchmarking (as a driver to improvement in a competitive environment).

Leadership

Concept: management should demonstrate leadership by:

- Recognizing IQ as a strategic issue.
- Allocating the appropriate resources to IQ improvement – capital, management attention, vision and priorities.
- Setting an example as the first to require, use or provide better quality information. This role is the responsibility of all management levels, from the company president down to team leaders.

Customer Focus

The modern quality paradigms emphasize the importance of customer satisfaction as a driver to the improvement process. IQ improvement efforts should focus on the identification of users, specification of their true IQ needs, and fulfilment of these requirements.

Caution The "voice of the customer" should lead the entire improvement process.

Teamwork

Specification of IQ needs and metrics, as well as fulfilment control are based on teamwork operation. All stakeholders are included in the team. A typical team hosts representatives from the information users' group, information providers, information solutions' suppliers,

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information organization and other relevant parties. A certain level of management participation is required as well. All the above functions are responsible for higher quality of information.

Measurement

IQ metrics are used to translate the information user needs into measurable specifications. These specifications should be designed into the information solution. Once the solution is provided, IQ metrics are used to assess the solution's actual performance against the requirements, and effectively against user needs due to the special importance of this concept to the InfoQual methodology.

Benchmarking

In order to achieve "world class" IQ, it is necessary to explore what IQ levels are achieved in the "external world". We refer here to other functions in your organization, other organizations in your industry or even other industries and professional domains. Benchmarking supports the IQ improvement team in setting high but realistic targets that energise the process. Benchmarking is also a useful tool to discover new and practicable metrics and methods to measure IQ.

Continuous Improvement

In the field of IQ, quality improvement efforts are not a onetime effort. There are two aspects to this concept: cultural and methodological.

1. ***Cultural aspect:*** In a culture that promotes IQ continuous improvement, each member deals with the following questions: What is the meaning of high quality information? How is it defined and measured? Do I require, obtain and use high quality information? Do I provide such information? What must I do in order to get or provide better information?
2. ***Methodology aspect:*** The cultural aspects of IQ are beyond this paper's scope. However, it should be noted that IQ culture cannot be achieved by having the company president stating, "Information is critical, let's improve it continuously." Rather, it should be deployed via a series of practicable improvement activities. Implementing a methodology such as InfoQual can help create the common language and behavioral habits of an IQ culture. The InfoQual methodology is based on the PDCA (Plan Do Check Act) cycle, a popular model to organize the improvement process (Hari, 1995). The cycle is based on four phases:
   - *Plan:* Improvement objectives are identified, scope is agreed, metrics are specified and targets are set.
   - *Do:* Here the actual improvement activities are conducted (e.g. introduction of a new information solution)
   - *Check:* The performance of the new solution (i.e. the quality of information) is checked against the predefined metrics.
   - *Act:* The actions required to close the gaps between the required and actual IQ performance are designed and conducted.

Once completed, the cycle is reiterated in order to achieve further improvements.

Self Assessment

Fill in the blanks:

16. ..... is a management approach aimed at satisfying all customer requirements.

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17. The modern quality paradigms emphasize the importance of …… as a driver to the improvement process.

18. …….. supports the IQ improvement team in setting high but realistic targets that energise the process.

19. The InfoQual methodology is based on the…….. , a popular model to organize the improvement process.

3.5 Basic Elements of TQM

Total Quality Management helps to improve product quality using a long-term approach at improving production and customer satisfaction while decreasing wastes. TQM has been around for 60 years now and it continues to grow strong alongside Six Sigma and other process improvement strategies.

The basic elements of TQM are:

Figure 3.2: Basic Elements of TQM

1. ***Ethics:*** There are two different types of ethics in the business world, customer ethics and company ethics. The company ethics set the standard for quality and performance and the customer ethics set the standard for approval. Our personal set of ethics plays a large role in TQM because it helps to determine what is fair and what is outright wrong. Some companies will try to gauge their customers with high prices so they can turn a larger profit. Companies that have ethics recognize that higher prices should only be charged if you need to increase the quality of the product.

2. ***Integrity:*** Employee's personal ethics determine if they are truthful about their job performance. This makes up their integrity as a person. Companies like people also have integrity. Using TQM helps the companies to convey their integrity to their customers by building high-quality products and charging reasonable prices. With integrity, products are often looked at as "what you see is what you get". However if you have established honesty and trust with your customers, they will hold your products to a higher standard.

3. ***Trust:*** Following along with ethics and integrity is trust. Without trust, your company will not be able to successfully implement TQM. Trust is one of the key elements you need to have because it defines your market. These customers will continue buying from your company because of the level of trust you have developed with one another. The tricky thing about trust is that each of your employees is responsible for their own actions. If they cause a problem with a customer, your customer may lose trust in the company until another person can restore it.

Notes

4. ***Training:*** TQM looks at improving several processes and training is one of the biggest problems companies have. Improper training can cause product malfunctions, loss of customers, and waste. Spending time on proper training will save you a large headache down the road and it helps to build employee loyalty.
5. ***Teamwork:*** TQM has been able to establish a smooth-flowing office environment because it is based upon teamwork. When individuals work in teams, they are able to solve some of their problems faster and this provides accurate solutions.
6. ***Leadership:*** The most important part of TQM is your managers. These individuals must be able to lead the rest of the company on this new organizational approach. The managers must be trustworthy individuals that other employees respect and want to follow. They need someone that can take charge and clearly communicate all the company needs. Effective leaders will make your new system work as they need to work with employees to get them to change the way they currently work.
7. ***Communication:*** Right up there with leadership is communication. Many companies fail because they lack proper communication skills. Instead of letting this happen to your company, establish rules about proper communication. If you notice problems between departments, take the initiative to fix them.
8. ***Recognition:*** Another way TQM can help your business is by recognizing employees for their hard work. When employees are recognized, they are less likely to experience burnout and many of them have increased energy, which helps to boost morale. Providing employees with positive reinforcement is one of the best ways to let your employees know you appreciate their hard work.

Self Assessment

Fill in the blanks:

20. The ……. set the standard for quality and performance and the …….. set the standard for approval.
21. Employee's personal ethics determine if they are truthful about their……. .
22. …….. can cause product malfunctions, loss of customers, and waste.
23. Providing employees with …… is one of the best ways to let your employees know you appreciate their hard work.

3.6 Obstacles and Benefits of TQM

Obstacles

TQM is not just another fashionable management theory. It is not a quick fix to solve the problems overnight. There are many barriers to implementing Total Quality Management. They show themselves in all business sectors-manufacturing, services, government and even education.

Therefore, it is important for all organizations to understand and avoid these barriers both before and during TQM implementation. It takes a long time to build the appropriate emphasis and techniques into the culture. Overemphasis on short-term results and profits has to be avoided.

These barriers can be divided into two categories:

1. Organizational barriers
2. Behavioral barriers

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Organizational Barriers

These are the most visible barriers of TQM implementation and are spread all over organization.

1. ***Lack of Commitment by Top Management:*** The primary responsibility of TQM rests with the top management. Therefore, there must be substantial commitment by top management for TQM. This commitment must be manifest by the management time and organizational resources they keep for implementation of TQM. In some organizations, the quality initiative is delegated to an outside expert. When top management commitment is missing, it passes on to other levels easily. All such organizations experience employee participation and interest in TQM programs.

2. ***Lack of continuous Training and Education:*** Lack of training is the next most important obstacle. This gives rise to confusion about the various aspects of the program. This is like building walls and ceiling without laying the foundation. Naturally, such a structure would collapse. Training and education is an ongoing process for everyone in the organization. When senior management conducts the training on the principles of TQM, its effectiveness increases. Needs must be determined and a plan must be developed to achieve those needs. They could be a lack of training in group discussion and communication techniques, quality improvement skills, problem identification, for problem solving affects implementation of TQM.

3. ***Improper Planning:*** Planning accounts for more than 50% of the job. Planning works well when all the concerned people are involved. TQM is no exception. TQM is about empowerment of people and participative management. All constituents of the organization should be the goal. Financial or sales goals take a back seat.

4. ***Inadequate use of empowerment and teamwork:*** TQM is all about teamwork, participative management and empowerment of employees. However, working in teams is an approach that has to be learned. The Team members need to have proper training. Supervision must learn how to be effective coaches. Further employees need to be empowered to take decisions that affect the efficiency of their process. The lacks of these result in frustration.

5. ***Inability to change organizational culture:*** The organization must undergo cultural change before teamwork can succeed. Individuals resist change. The resistance has to be overcome. It is very difficult to change an organization's culture and it takes time. It may take around five years for individuals to unlearn the old ways and learn the new ways. Once they are accustomed to doing a particular process it becomes the preferred way.

   People change only when they want to and only to meet their own needs. Nobody would change for the organization unless adequate reason is given and accepted by him or her. Management must understand and utilize these basic concepts of change. Further people must be moved from a state of fear to trust for accepting a change.

   Lack of effective communication and emphasis on short-term results are the main reasons for this. Sufficient time has to be spent by organizations for planning for the cultural aspects of implementing a TQM program.

6. ***Incompatible Organizational Structure and Isolated Individuals and Departments:*** More often, the organizational structure may not be conducive to team building. It can create differences between various departments and between individuals. These differences may create implementation problems. Use of multifunctional terms can help to rectify this. The whole organization has to be made customer oriented to make it more responsive to customer needs. The organization will have to be structured for the same.

7. ***Ineffective Measurement Techniques and Lack of Access to Data and Results:*** Effective measurement acts as a booster to the improvements made. It would also inspire and

Notes

encourage the participants to achieve more on the hand and to rectify and improve on the other hand. It is equally important that the progress is known within a reasonable period of time. Otherwise people lose interest and become frustrated. Access to relevant and quick retrieval is necessary for this. Effective decisions cannot be made in their absence.

8. ***Paying inadequate attention to internal and external Customers:*** The needs and expectations of customers will be changing over time. There are internal suppliers and internal customers. If we want to take care of the ultimate external customer, it is essential that the internal customer's en route have to be properly attended to. Organization needs to understand this through effective feedback mechanisms.

9. ***Failure to Continually Improve:*** One of the cardinal principles of TQM is continuous improvement. This continuous improvement is a journey and not a destination. A lack of continuous improvements of the process, product, and/or service is bound to make the implementation a failure.

10. ***Apparent lack of business experience and knowledge:*** This aspect of continuous improvement in all the activities of an organization implies continuous learning and improving knowledge and experience. Every mistake is a valuable lesson in experience. People have to upgrade not only their knowledge about the product and process but also about customer's perception changes.

11. ***Taking narrow dogmatic approach:*** Some organizations are determined to follow the Deming approach or Juran approach or Crosby approach, etc. It must be remembered that the each of the quality gurus and other experts have made valuable contribution. For TQM to be successful, it is imperative that organization has to assimilate from all these philosophies and create a blue print for their success.

Behavioral Barriers

Some people do not want the implementation of TQM in the organization. This arises due to:

1. Individual values, attitudes, perception, personality, etc.
2. Lack of training, and learning opportunities
3. Management styles, viz. autocratic, democratic or laissez-faire
4. Level of success and
5. Organizational structure itself doesn't permit the implementation of TQM

Other important obstacles are:

1. Lack of empowerment of workers, viz. lack of trust or confidence in them
2. Lack of cross-functional, cross-disciplinary efforts
3. Lack of proper delegation of responsibility and authority
4. Lack of cost-of-quality measurement, performance reporting and reward/formal recognition systems
5. Emphasis on quick fixes and low-level reforms, short-term performance at the expense of long-term improvements
6. Misdirected focus – emphasis on the trivial many problems facing the company rather than a critical few
7. Emphasis on internal processes to the neglect of external – customer – focused – results
8. Limitation of financial as well as human resources.

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Benefits

Various total quality management benefits are:

1. Reduction of defects because TQM promotes quality awareness and participation of all members of the organization, not just the QA or QC department. It means quality at the source
2. Total quality management system leads to ease of problem solving. Through measurements such as SPC and other techniques such as failure analysis, defects and failures (even potential failures) can be identified and addressed
3. TQM also leads to continuous improvement of processes and products. TQM system should also improve the efficiency of people and machine
4. TQM leads to quality products which leads to customer satisfaction
5. And finally, by reducing defects and improving machine and personnel efficiency, TQM should lead to cost savings and profitability improvement (bottom line)
6. A philosophy that improves business from top to bottom
7. A focused, systematic and structured approach to enhancing customer's satisfaction
8. Process improvement methods that reduce or eliminate problems, i.e. non-conformance costs
9. Tools and techniques for improvement – quality operating system
10. Delivering what the customer wants in terms of service, product and the whole experience
11. Intrinsic motivation and improved attitudes throughout the workforce
12. Workforce is proactive – prevention orientated
13. Enhanced communication
14. Reduction in waste and rework
15. Increase in process ownership – employee involvement and empowerment
16. Everyone from top to bottom educated
17. Improved customer/supplier relationships (internally and externally)
18. Market competitiveness
19. Quality based management system for ISO 9001:2000 certification.

Self Assessment

Fill in the blanks:

24. The primary responsibility of TQM rests with the ……. management.
25. …….. and education is an ongoing process for everyone in the organization.
26. …… is about empowerment of people and participative management.
27. ……. measurement acts as a booster to the improvements made.
28. Total quality management system leads to ease of…… .
29. TQM leads to continuous …….. of processes and products.

Notes

Case Study

RPG Enterprises, India

TQM Saves Millions of Dollars in Quality Costs

In 1996, the management of RPG Enterprises, a large business house in India, determined that quality management was to be the major competitive tool to take the company to global leadership. To facilitate, encourage and motivate staff towards quality excellence throughout the group the company initiated the RPG Quality Awards. The awards' criteria and system measured results in terms of customer satisfaction, employee satisfaction, business results and impact on society. As a result of their implementation, the following results occurred:

1. Increased quality awareness among the group's companies and made TQM an important topic within the group. Staff started talking about the awards, their eligibility, the criteria, the application and selection process, the winners and their achievements;
2. Generated healthy competition among the group companies;
3. Provided direction and created a uniform TQM culture throughout the group;
4. Recognised contributions made by individual units and motivated managements and employees to work towards improvements on a continuing basis;
5. Improved performance of the company in both financial and non-financial areas;
6. Improved business results which enhanced the competitive position among domestic and global players;
7. The award criteria provided checklists that helped group companies focus their attention on items they might not have otherwise thought of;
8. The award criteria provided benchmarks for measuring company performance and individual performance;
9. The advantages of corporate quality awards were increasingly recognised by management within the group;
10. Contributed to greater improvement efforts all round and helped RPG's TQM initiative; in 1996 the company saved US$ 0.2 million in poor quality costs from 52 successful TQM projects. In 2000, the company saved US$ 24.4 million in poor quality costs from 2520 successful TQM projects.

Questions

1. Explain the need for introducing quality award by the RPG. Do you think an award within the company can contribute to quality improvement? How?
2. What principles of TQM were incorporated into the quality award introduced by the company?
3. Discuss how the company was able to reduce costs.

Source: http://www.bpir.com/total-quality-management-bpir.com/menu-id-72/example-cases.html

Notes

3.7 Summary

- Quality can be defined as the degree to which a product is fit for the specific use. It can be defined as products and services beyond present needs and expectations of customers.
- The quality of a product is determined by how well it suits one's needs in terms of reliability, durability, safety, maintainability & cost.
- Quality exists in five distinct dimensions. It is made up of experience, measurement, relationships and systems, thinking inter-connectivity and paradigm logic & value sharing.
- TQM comprises four process steps namely–kaizen, Atarimae Hinshitsu, Kansei, Miryokuteki Hinshitsu.
- The modern definition of quality centers on meeting or exceeding customer expectations. Thus, the customer is the principle judge of quality.
- Customer focus extends beyond the consumers and internal relationship to the society which represents an important customer of business.
- Participation of employees can be encouraged by implementing suggestion systems or schemes that act quickly, provide feedback and reward good suggestions.
- Employee involvement involves changing organizational culture, fostering individual development through training, establishment awards and incentives and encouraging team work.
- Learning refers to adapting to change, leading to new goals and approaches. Learning takes place via feedback between practices and results.
- Shewhart, Deming, Juran, Figenbaum, Ishikawa, Crosby, and Taguchi contributed to the development of principles and practices and/or the tools and techniques.
- Total Quality Management is a management approach aimed at satisfying all customer requirements, needs and expectations using a Continuous Improvement approach.
- IQ metrics are used to translate the information user needs into measurable specifications.
- Benchmarking supports the IQ improvement team in setting high but realistic targets that energise the process.
- The InfoQual methodology is based on the PDCA (Plan Do Check Act) cycle, a popular model to organize the improvement process.
- Total Quality Management helps to improve product quality using a long-term approach at improving production and customer satisfaction while decreasing wastes.

3.8 Keywords

***Atarimae Hinshitsu*:** The idea that things will work as they are supposed to is referred to as Atarimae Hinshitsu.

***Benchmarking*:** A surveyor's mark on a permanent object of predetermined position and elevation used as a reference point is known as benchmarking.

***Continuous Improvement*:** It refers to the concept that continuous focus on improving an organization's performance – from assembly line to the CEO – is a permanent objective.

***Employee Involvement*:** Giving employees input and allowing them an impact on decisions affecting their jobs is known as employee involvement.

Notes

***Just-in-Time*:** The principle of production and inventory control in which goods arrive when needed for production or use is called as just in time.

***Kaizen*:** Kaizen is a system of continuous improvement in quality, technology, processes, company culture, productivity, safety and leadership.

***Kansei*:** It is a Japanese term for computing that relates to, arises from, or is influenced by human characteristics such as sensibility, perception, affection or subjectivity.

***Miryokuteki Hinshitsu*:** The idea that things should have an aesthetic quality is known as Miryokuteki Hinshitsu.

***Quality*:** Quality is defined as the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs.

***Systems Thinking*:** Systems thinking is a way of understanding reality that emphasizes the relationships among a system's parts, rather than the parts themselves.

***Value Sharing*:** Value sharing is a universal paradigm that provides a foundation for a complete quality system.

3.9 Review Questions

1. Explain the concept & dimensions of quality.
2. What are the various steps in TQM process? Elaborate.
3. Discuss on the principles of TQM.
4. Explain TQM framework with special reference to continuous improvement and customer focus.
5. Write a short note on the basic elements of TQM.
6. Mention the obstacles and benefits of TQM.
7. What are the two types of barriers? Differentiate between them.
8. Why we need quality management? Explain.
9. Briefly explain the concept of continuous improvement.
10. Discuss the role of top management in total quality management.

Answers: Self Assessment

1. Quality
2. degree
3. five
4. Experience
5. Measurement
6. interconnectivity
7. Value sharing
8. Kaizen
9. quality standard

Notes

10. customer expectations
11. Customer focus
12. systems and procedures
13. Customer Satisfaction Model
14. Employee empowerment
15. Learning
16. Total Quality Management
17. customer satisfaction
18. Benchmarking
19. PDCA cycle
20. company ethics; customer ethics
21. job performance
22. Improper training
23. positive reinforcement
24. Top
25. Training
26. TQM
27. Effective
28. problem solving
29. improvement

3.10 Further Readings

Books

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Notes

Unit 4: Leadership for TQM

CONTENTS

Objectives
Introduction
4.1 Leadership
4.2 Characteristics of Quality Leaders
4.3 Role of TQM Leaders
4.4 Attitudes and Involvement of Top Management
4.4.1 Nature of Attitudes and their Dimensions
4.4.2 Types of Attitudes
4.4.3 Components
4.5 Leadership Concepts
4.5.1 Seven Habits
4.5.2 The Deming Philosophy
4.6 Quality Council
4.6.1 Core Values
4.7 Organizational Implications
4.8 Summary
4.9 Keywords
4.10 Review Questions
4.11 Further Readings

Objectives

After studying this unit, you will be able to:

- Define leadership
- Discuss the characteristics of quality leaders
- Explain the various roles of TQM leaders
- Explain organizational implications

Introduction

In previous unit, we dealt with the concept of quality, the process steps in TQM, its principles, framework and the basic elements of TQM. We also discussed some of the barriers and benefits of TQM. This unit will help you to understand the importance of leadership in TQM.

There is no universal definition of leadership and indeed many books have been devoted to the topic of leadership. James MacGregor Burns, in his book Leadership, describes a leader as one

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who instills purposes, not one who controls by brute force. A leader strengthens and inspires the followers to accomplish shared goals. Leaders shape the organization's values, promote the organization's values, protect the organization's values and exemplify the organization's values. Ultimately, Burns says, "Leaders and followers raise one another to higher levels of motivation and morality. Leadership becomes moral in that it raises the level of human conduct and ethical aspiration of both the leader and the led, and thus has a transforming effect on both." Similarly, Daimler Chrysler's CEO Bob Eaton defines a leader as "someone who can be a group of people to a place they don't think they can go." "Leadership is we, not me; mission, not my show; vision, not division; and community, not domicile." As the above illustrates, leadership is difficult to define in anything other than lofty words.

4.1 Leadership

The Malcolm Baldrige National Quality Award has a more grounded definition of leadership in its core values. As stated in its core values and concepts, visionary leadership is:

"An organization's senior leaders should set directions and create a customer focus, clear and visible values, and high expectations. The directions, values, and expectations, should balance the needs of all your stakeholders. Your leaders should ensure the creation of strategies, systems, and methods for achieving excellence, stimulating innovation, and building knowledge and capabilities. The values and strategies should help guide all activities and decisions of your organization. Senior leaders should inspire and motivate your entire workforce and should encourage all employees to contribute, to develop and learn, to be innovative, and to be creative. Senior leaders should serve as role models through their ethical behavior and their personal involvement in planning, communications, coaching, development of future leaders, review of organizational performance, and employee recognition. As role models, they can reinforce values and expectations while building leadership, commitment, and initiative throughout your organization."

Self Assessment

Fill in the blanks:

1. A leader strengthens and inspires the followers to accomplish…….. .
2. ……. CEO Bob Eaton defines a leader as "someone who can be a group of people to a place they don't think they can go."

4.2 Characteristics of Quality Leaders

The main behaviors or characteristics that successful quality leaders demonstrate:

- They give priority attention to external and internal customers and their needs. Leaders place themselves in the customers' shoes and service their needs from that perspective. They continually evaluate the customers' changing requirements.
- They empower, rather than control, subordinates. Leaders have trust and confidence in the performance of their subordinates. They provide the resources, training, and work environment to help subordinates do their jobs. However, the decision to accept responsibility lies with the individual.
- They emphasize improvement rather than maintenance. Leader use the phrase "If it isn't perfect, improves it" rather than "If it ain't broke, don't fix it." There is always room for improvement, ever if the improvement is small. Major breakthroughs sometimes happen, but it's the little ones that keep the continuous process improvement on a positive track.

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- They emphasize prevention. "An ounce of prevention is worth a pound of cure" is certainly true. It is also true that perfection can be the enemy of creativity. We can't always wait until we have created the perfect process or product.

Notes There must be a balance between preventing problems and developing better, but no perfect, processes.

- They encourage collaboration rather than competition. When functional areas, departments, or work groups are in competition, they may find subtle ways of working against each other or withholding information. Instead, there must be collaboration among and within units.
- They train and coach, rather than direct and supervise. Leaders know that the development of the human resource is a necessity. As coaches, they help their subordinates learn to do a better job.
- They learn from problems. When a problem exists, it is treated as an opportunity rather than something to be minimized or covered up. "What caused it?" and "How can we prevent it in the future?" are the questions quality leaders ask.
- They continually try to improve communications. Leaders continually disseminate information about the TQM effort. They make it evident that TQM is not just a slogan. Communication is two ways—ideas will be generated by people when leaders encourage them and act upon them. Communication is the glue that holds a TQM organization together.

Example: On the eve of Desert Storm, General Colin Powell solicited enlisted men and women for advice on winning the war.

- They continually demonstrate their commitment to quality. Leaders walk their talk—their actions, rather than their words, communicate their level of commitment. They let the quality statements be their decision-making guide.
- They choose suppliers on the basis of quality, not price. Suppliers are encouraged to participate on project teams and become involved. Leaders know that quality begins with quality materials and the true measure is the life-cycle cost.
- They establish organizational systems to support the quality effort. At the senior management level a quality council is provided, and at the first-line supervisor level, work groups and project teams are organized to improve the process.
- They encourage and recognize team effort. They encourage, provide recognition, and reward individuals and teams. Leaders know that people like to know that their contributions are appreciated and important. This action is one of the leader's most powerful tools.

Self Assessment

Fill in the blanks:

3. Leaders have trust and confidence in the performance of their…… .
4. …….. continually disseminate information about the TQM effort.

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4.3 Role of TQM Leaders

Everyone is responsible for quality, especially senior management and the CEO; however, only the latter can provide the leadership system to achieve results. For instance, in the 1980s, General Electric's CEO, Jack Welch, instituted leadership training courses at all levels of the organization. The General Electric training courses taught leadership approaches and models and provided the opportunity for teams to develop solutions to real business problems. Many of the solutions the teams developed were implemented. Jack Welch supported the development of a leadership system whereby quality control leaders were developed at all levels in all functions of the organization, including research, marketing, manufacturing, sales, finance, and human resources. Senior managers need to be provided with the skills to implement quality control techniques and actively participate in the quality council.

Senior management has numerous responsibilities.

Notes Senior management must practice the philosophy of Management by Wandering Around (MBWA). Management should get out of the office and visit customers, suppliers, departments within the organization, and plants within the organization. That way, managers learn what is happening with particular customer, supplier, or project. MBWA can substantially reduce paperwork. Encourage subordinates to write only important message that need to be part of the permanent record.

Example: Kinko's executives perform normal operating duties for two or three days at one location.

This approach is an excellent technique for gaining firsthand information.

The idea is to let employees think for themselves. Senior management's role is no longer to make the final decision, but to make sure the team's decision is aligned with the quality statements of the organization. Push problem solving and decision making to the lowest appropriate level by delegating authority and responsibility.

Caution Senior managers must stay informed on the topic of quality improvement by reading books and articles, attending seminars, and talking to other TQM leaders. The leader sends a strong message to subordinates when that leader asks if they have read a particular book or article.

The needed resources must be provided to train employees in the TQM tools and techniques, the technical requirements of the job, and safety. Resources in the form of the appropriate equipment to do the job must also be provided.

Senior managers must find time to celebrate the success of their organization's quality efforts by personally participating in award and recognition ceremonies. This activity is an excellent opportunity to reinforce the importance of the effort and to promote TQM.

Did u know? A phone call or handshake combined with a sincere "thank you for a job well done" is a powerful form of recognition and reward.

One of the duties of the quality council is to establish or revise the recognition and reward system. In particular, senior management's incentive compensation must include quality

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improvement performance. Also, provisions must be made to reward teams as well as creative individuals.

Senior managers must be visible and actively engaged in the quality effort by serving on teams, coaching teams and teaching seminars. They should lead by demonstrating, communicating, and reinforcing the quality statement. As a rule of thumb, they should spend about one-third of their time on quality.

A very important role of senior managers is listening to internal and external customers and suppliers through visits, focus groups, and surveys. This information is translated into core values and process improvement projects.

Another very important role is communication. The objective is to create awareness of the importance of TQM and provide TQM results in an ongoing manner. The TQM message must be "sold" to personnel, for if they don't but it, TQM will never happen. In addition to internal efforts, there must be external activities with customers and suppliers, the media, advertising in trade magazines, and interaction with the quality community.

By following the preceding suggestions, senior managers should be able to drive fear out of the organization, break down barriers, remove system roadblocks, anticipate and minimize resistance to change, and, in general, change the culture. Only with the involvement of senior management can TQM be a success.

Caselet

How one Company Successfully Implemented Continuous Improvement

As an illustration of quality management in action, one construction company procedure was enacted by establishing a daily foreman's meeting that usually lasts one hour. Although an hour may have appeared to be a long time, the company and its people believe it to be worthwhile. Every person in the company has an opportunity to relate the status of his or her task in the work cycle.

Included among the benefits from conducting this daily foreman's meeting are the elimination of conflicts between crews and crafts at jobsites, work crews not occupying the same space at the same time, and the entire working staff becoming and remaining knowledgeable about all phases and problems which exist at the jobsite. Additional benefits include improved coordination with other trades, increased problem solving, and improved morale and efforts as a result of the ability to directly air concerns.

Self Assessment

Fill in the blanks:

5. …… supported the development of a leadership system whereby quality control leaders were developed at all levels in all functions of the organization.
6. Senior management must practice the philosophy of……. .
7. One of the duties of the …….. is to establish or revise the recognition and reward system.

4.4 Attitudes and Involvement of Top Management

Attitudes can be simply referred to as evaluative statements, which may be either favorable, regarding people, objects or events. Attitudes reflect how one feels about something. For instance,

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if you say "I like my work," then you are merely expressing your attitude about your work. Attitudes and values are not similar, though they are interrelated. So now let us look at attitudes in depth.

4.4.1 Nature of Attitudes and their Dimensions

Attitude is often used in describing people and in explaining their behavior. What then is an attitude? Let us understand this with a simple example. If someone says "I like his attitude" or that "our employees produce quality products, because of positive attitude." The person is clearly referring to attitude. Now let us define an attitude. An attitude can be defined as a continuous tendency to feel and behave in a specific way toward some object.

Example: If we say that Shilpa hates working overtime. This means that Shilpa has a negative attitude towards overtime.

Attitudes being subtle cognitive process, they can be characterized in three ways. The first important thing is that they tend to continue until and unless something is done to change them. For instance, if Shilpa gets compensatory time-off after an overtime assignment or if she gets paid for overtime, she may change her attitude towards overtime. Secondly, attitudes generally fall anywhere between extremely favorable and extremely unfavorable. May be at the moment Shilpa's attitude is moderately unfavorable, but when she is given compensatory off or is given extra payment, her attitude may turn to extremely positive. Thirdly, attitudes are aimed at some object about which the person has some associated feelings, (which is sometime referred to as "affect") and beliefs. In Shilpa's case it is "overtime". Now let us look at the different types and components of attitudes in order to understand them better.

4.4.2 Types of Attitudes

An individual can have several attitudes, but in Organizational Behavior we are only concerned with job-related attitudes. These job-related attitudes explore the positive or negative evaluations that employees possess about aspects of their work environment. In OB, there are three very important work related attitudes: job satisfaction, job involvement and organizational commitment.

Example: If somebody does not like traveling on work, he has a negative attitude towards a particular aspect of his work.

4.4.3 Components

Attitudes can be broken down into three components. These are the emotional, the informational and the behavioral. The emotional component refers to a person's feelings or affect about an object, i.e. it may be positive, neutral or negative. Emotion is accorded maximum attention in OB literature in relation to job satisfaction. The expression of emotions- be they positive, for example in case of a sales representative, or negative in case of a police officer or neutral, in case of a bureaucrat – is important to work-related behavior.

The informational component comprises of the beliefs and information the individual has about the object. It does not make any difference even if the information is empirically real or not.

Example: A supervisor may believe that each worker should produce 10 units per day. Even though in reality, an average worker may be able to produce only 8 units. Here it should

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be noted that the information that supervisor has about a worker's capacity to produce, though not correct, shapes his attitude to productivity.

The behavioral component comprises of a person's tendencies to behave in a particular fashion towards an object. For instance, in the example given the supervisor may force workers to produce 10 units.

Did u know? Out of the three components of attitudes, we can see only the behavioral component. We cannot see other people's feeling or even the information component. These two can only be derived.

Let's look at the example of the supervisor once again. When the supervisor forces his worker to produce 10 units, we can arrive at two things. One is that the supervisor feels very strongly about productivity. And secondly, he believes that producing 10 units is necessary. It is therefore important to study the antecedents of work-related attitudes.

Self Assessment

Fill in the blanks:

8. ……. is often used in describing people and in explaining their behavior.
9. The …… component refers to a person's feelings or affect about an object.
10. The …… component comprises of a person's tendencies to behave in a particular fashion towards an object.
11. The …… component comprises of the beliefs and information the individual has about the object.

4.5 Leadership Concepts

The various concepts of leadership are:

4.5.1 Seven Habits

Stephen R. Covey, in his book "The 7 habits of highly effective people", talked about the 7 habits which are required in a leader.

1. ***Be Proactive:*** Proactive people think beforehand and are ready to face a situation. Reactive people react as per the situation and react on whims and emotions. A proactive person can plan beforehand for an eventuality. If you are well prepared then you can face a situation or solve a problem more efficiently.
2. ***Begin with the end in Mind:*** "If you don't know where to go then you will reach nowhere" goes an old saying. Start a task with set goals. Goals are important as they tell you where to go. They help in focusing your approach as well. Remember the famous incident from Mahabharata where Guru Dronacharya asks his disciple about what they could see during target practice. Arjuna gives the most perfect answer as he was focusing on the target. Because of his focused approach Arjuna became one of the best archers of his time.
3. ***Put First Things First:*** Because of multitude of tasks and assignments one needs to prioritize. This helps in giving more attention to more important things at hand.
4. ***Think win-win:*** Think about mutual benefits rather than your own benefit alone. Everybody wants to have an upper hand in life and in business dealings. But this is practically not possible. So best way is to find is the middle of the road.

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5. ***Seek first to understand, then to be understood:*** First give other people ample time to express themselves. This will help on many fronts. The other person gets enough opportunity to say what he wants to say. You get an opportunity to understand other's perspective. You get enough time to strategize accordingly.

6. ***Synergy:*** The best example of team work can be learnt from a pleasant orchestra or 'jugalbandi' in Indian classical music. Especially in Indian classical music you will observe how maestros bury their egos and come out with astounding performances.

7. ***Sharpen the Saw:*** Skill building or practice is very important. Nobody is perfect and perfection is a thing which can never be achieved in one's lifetime. Moreover, it always pays to practice as much as you can.

4.5.2 The Deming Philosophy

Known as the father of quality, Deming was a statistics professor at New York University during the 40s. He studied for several years with Walter Shewhart and was involved in assisting Japanese companies to reborn from their own ashes. His contribution was in improving quality, by setting a 14-point principle which should be the foundation for achieving quality improvements. Japanese companies applied extensively these principles. Today's power of Japan and quality of their products has a strong root in this matter. Deming emphasized on the role of management in achieving quality.

Deming's 14 principles are:

1. Create constancy of purpose (short term reactions has to be replaced by long-term planning),

2. Adopt the new philosophy (management should adopt his philosophy, rather than to expect the employees to do that),

3. Cease dependence on inspection (it concerns to variation. In other words, if there is no variation, no inspection is needed because no product shows any defects),

4. Move towards a single supplier for any one item (working with several suppliers, automatically involves variation in raw materials),

5. Improve constantly and forever (it refers to decreasing variation, as a key to better quality),

6. Institute training on the job (another source of variation is the lack of training of workers; train them properly to do a certain job, and they will do it with far less variation),

7. Institute leadership (distinction between leadership and supervising),

8. Drive out fear (eliminate fear at worker's level to get their support for improvements. Fear is counter-productive),

9. Break down barriers between departments (here comes the concept of "internal customer" which is found in TQM; a department is a supplier for next one. The second one is the client for the first one),

10. Eliminate slogans (usually, it's not the employee who did it wrong, but it's the system who allowed that. No need to create tension on worker, as long as the system fails to prevent problems),

11. Eliminate management by objectives (as long as workers had to achieve an established production level, quality will be a secondary target),

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12. Remove barriers to pride of workmanship (bringing problems all the time to worker's ears, will create a discomfort for them. Lower satisfaction of workers equals a lower interest for doing good items),
13. Institute education and self improvement (education is an asset. Everyone has to improve themselves),
14. Transformation is everyone's job (improvement exists at every level).

Task Make a presentation on the similarities and differences between the concepts of leadership.

Self Assessment

Fill in the blanks:

12. ……. people think beforehand and are ready to face a situation.
13. …… are important as they help in focusing your approach.
14. …….. is known as the father of quality.
15. Deming emphasized on the role of management in achieving……. .

4.6 Quality Council

A quality council is established to provide overall direction. The council is composed of

- Chief Executive Officer
- Senior Managers
- Coordinator or Consultant
- A representative from the Union

Duties of the council are:

1. Develop the core values, vision statement, mission statement and quality policy statement.
2. Develop the strategic long term plan with goals and Annual Quality Improvement Program with objectives
3. Create the total education and training plan
4. Determine and monitor the cost of poor quality
5. Determine the performance measures
6. Determine projects those improve the process
7. Establish multifunctional project and work group teams
8. Revise the recognition and rewards system

A typical meeting agenda will have the following items:

- Progress report on teams
- Customer satisfaction report

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- Progress on meeting goals
- New project teams
- Benchmarking report

Within three to five years, the quality council activities will become ingrained in the culture of the organization.

4.6.1 Core Values

Core values foster TQM behaviour and define the culture.

Some examples from Malcolm Baldrige National Quality Award:

- Visionary leadership
- Customer driven excellence
- Organizational and personal learning
- Valuing employees and partners
- Agility
- Focus on the future
- Managing for innovation
- Management by fact
- Public responsibility and citizenship
- Focus on results and creating value
- Systems perspective

4.7 Organizational Implications

It is imperative for managers to understand organization. Nothing precisely could hold a greater interest for an organization than the changing employees' profiles and behavioral patterns. Look around and you will surely see that an average Indian employee, whether he is working for a Tata company or a multinational like Johnson & Johnson, is growing younger and younger. To site an example, an average employee working in Tata Interactive Systems, a service company is 24-25 years of age. Another common feature of organizational change is that there is high job mobility amongst employees. Gone are the days when people would stick to a company throughout their lifetime. Today employees do not hold loyalty as an important value. Another subtle and positive change is the employee's willingness to learn at any given point in time during his career. The average employee today gives due importance to self-development opportunities.

And what's happening to the organization? The organizations are facing turbulent times with turnover rates posing constant challenges. Technological advances coupled with business incertitude are turning organizations into more proactive entities. Downsizing and VRS are common features of the corporate scenario today. Even the nationalized banks have announced VRS for their employees. Fast-paced change ensures that organizations have cutting-edge strategies to take care of their employees and satisfy their needs. In a post-liberalization India, the cutthroat competition unleashed with the advent of the multinationals has definitely made life a little challenging for the business houses. Mergers and acquisitions are the order of the day. Be the old-world pharmaceutical sector acquisitions of Burroughs Welcome by Galax or

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Bank of Madura's merger with India's largest private sector bank ICICI Bank. This means that corporate turbulence is not just because of technological changes but also because of shift in corporate paradigms. A manager's job in such a volatile scenario surely becomes more volatile and difficult. Organization has a unique role to play here by facilitating a sharper understanding of human behavior in an organizational contact.

Self Assessment

Fill in the blanks:

16. A …….. is established to provide overall direction.
17. A common feature of organizational change is that there is high …… amongst employees.
18. …….. and ……. are common features of the corporate scenario today.
19. …… is not just because of technological changes but also because of shift in corporate paradigms.

Case Study

Chrysler's Transmission Problem

Chrysler pioneered its immensely popular mini van in 1984, which quickly became the best selling product the company had ever built. Within five years, Chrysler held more than 50% of market share of mini vans. In 1989 Chrysler offered a new automatic transmission as an option in some of it's to models of mini vans and luxury automobiles. The new transmission immediately ran into trouble when many customers reported serious problems.

Claiming that it had made improvement to reduce the initial problem, Chrysler continued to use transmission. Meanwhile the centre of auto safety, a consumer group that monitors the auto industry charged that Chrysler had not tested the transmission before introducing it. The group's claim was supported by data on owner complaints and frequency of repairs. During the first years of ownership itself, about 20% of the owners were reporting problems with the new transmission.

For the 1991 model, Chrysler extensively modified the design of the vehicle but continued to use the same problematic transmission as standard equipment, with most of the large engines in high demand.

As a result, the Chrysler which was placed at the top in magazine "Consumer reports" for many years, dropped to bottom of the list in 1991, citing the transmission in particular as well as other signs of deteriorating quality. A new Toyota model captured the top spot of the year.

Questions

1. Make the brief presentation of the case.
2. To what factors might you attribute Chrysler's failure to maintain market leadership?
3. How might a stronger focus on quality have helped Chrysler?
4. What might have Chrysler done differently? Give suggestions.

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4.8 Summary

- James MacGregor Burns, in his book Leadership, describes a leader as one who instills purposes, not one who controls by brute force.
- Quality leaders give priority attention to external and internal customers and their needs.
- Everyone is responsible for quality, especially senior management and the CEO; however, only the latter can provide the leadership system to achieve results.
- Senior managers need to be provided with the skills to implement quality control techniques and actively participate in the quality council.
- Senior management must practice the philosophy of Management by Wandering Around (MBWA).
- Senior managers must be visible and actively engaged in the quality effort by serving on teams, coaching teams and teaching seminars.
- A very important role of senior managers is listening to internal and external customers and suppliers through visits, focus groups and surveys. This information is translated into core values and process improvement projects.
- Attitudes can be simply referred to as evaluative statements, which may be either favorable, regarding people, objects or events.
- Attitude is often used in describing people and in explaining their behavior.
- An attitude can be defined as a continuous tendency to feel and behave in a specific way toward some object.
- In OB, there are three very important work related attitudes: job satisfaction, job involvement and organizational commitment.
- Attitudes can be broken down into three components. These are the emotional, the informational and the behavioral.
- Deming's contribution was in improving quality, by setting a 14-point principle which should be the foundation for achieving quality improvements.
- A quality council is established to provide overall direction. Core values foster TQM behaviour and define the culture.
- A subtle and positive change is the employee's willingness to learn at any given point in time during his career. The average employee today gives due to importance to self-development opportunities.
- Technological advances coupled with business incertitude are turning organizations into more proactive entities. Downsizing and VRS are common features of the corporate scenario today.

4.9 Keywords

Attitude: A settled way of thinking or feeling, typically reflected in a person's behavior.

***Cognitive Process*:** Cognitive processes are the mental processes used by an individual to learn and retain information.

Core Values: A principle that guides an organization's internal conduct as well as its relationship with the external world.

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Employee Recognition: Employee recognition is one of the most effective and affordable ways to reduce turnover, curb absenteeism, increase productivity, and keep employees engaged with their work.

Job Involvement: The degree to which an employee identifies with his or her job, actively participates in it, and considers his or her job performance to be important to self-worth.

Job Satisfaction: The extent to which you are content with the work you do and the conditions which you work under.

Leadership: The action of leading a group of people or an organization.

Mission Statement: A formal summary of the aims and values of a company, organization, or individual.

Organizational Behavior: The systematic study and careful application of knowledge about how people – as individuals and as groups – act within organizations.

Organizational Strategies: An expression of how an organization needs to evolve over time to meet its objectives along with a detailed assessment of what needs to be done.

Vision Statement: An explicit statement of what you want to do, be or have in the future.

4.10 Review Questions

1. What do you understand by leadership? Explain.
2. Mention any ten characteristics of leaders.
3. Write a short note on the role of the TQM leaders with special emphasis on the role of senior management.
4. Explain attitude. What are the different types of attitude? How does the involvement of top management affect the attitude of employees?
5. Mention the 7 habits given by Stephen Covey.
6. What do you understand by Deming philosophy?
7. Briefly describe the 14 principles of Deming's philosophy.
8. Who are the members of quality council and what are their duties?
9. What do you understand by core values?
10. What, in your opinion, is required to be done by the organizations so as to maintain a healthy and positive attitude?

Answers: Self Assessment

1. shared goals
2. Daimler Chrysler
3. subordinates
4. Leaders
5. Jack Welch
6. Management by Wandering Around

Notes

7. Quality council
8. Attitude
9. Emotional
10. Behavioral
11. Informational
12. Proactive
13. Goals
14. Deming
15. Quality
16. Quality council
17. Job mobility
18. Downsizing; VRS
19. Corporate turbulence

4.11 Further Readings

Books

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Notes

Unit 5: Customer Satisfaction

CONTENTS

Objectives

Introduction

5.1 Customer Satisfaction

5.2 Customer Perception of Quality

5.2.1 Feedback

5.2.2 Customer Satisfaction Index

5.3 Summary

5.4 Keywords

5.5 Review Questions

5.6 Further Readings

Objectives

After studying this unit, you will be able to:

- Define customer satisfaction and their perception of quality
- Discuss various methods of feedback
- Explain customer satisfaction index

Introduction

Previous unit dealt with leadership in TQM, quality council and core values. It also discussed the various leadership concepts, viz. 7 habits and Deming philosophy. This unit will give you an insight on the concept of customer satisfaction and their perception of quality.

There are two distinct types of customers, i.e. external and internal. Internal customers are within the company–the colleagues working together for delivering a service or product for the external customer. An external customer may be an individual or an enterprise that hires or purchases the product(s) or service(s) from another person or business in exchange of money.

One of the most important factors for the success of an enterprise is its customers. Without them, a business cannot exist.

5.1 Customer Satisfaction

Customer satisfaction, a business term, is a measure of how products and services supplied by a company meet or surpass customer expectation. Customer satisfaction is not an objective statistics but more of a feeling or attitude. If a customer is happy with a product or a service it has hired or purchase they will pay their bills promptly, which greatly improves cash flow-the

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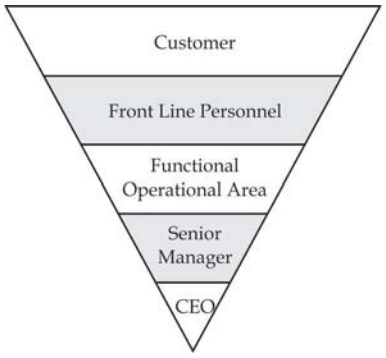
lifeblood of any organization. Customers that are satisfied will increase in number, buy more, and buy more frequently.

Figure 5.1: Customer Satisfaction Organization



This inverted pyramid is a good way to depict the importance of customers. He is at the top of the pyramid and the CEO is at the bottom. This shows the relative importance of people at the bottom of the hierarchy. A company never makes a product for its top management people, rather it is meant for the customer. As front line employees are in direct contact with people so they are in a better position to understand a customer's needs and problems.

Caution Every effort should be taken by the organization to seek opinion from front line employees. Even in case of empowerment it is front line employee who should be having more empowerment which will enable him to solve customer problem on the spot.

Self Assessment

Fill in the blanks:

1. One of the most important factors for the success of an enterprise is its …… .
2. …… is a measure of how products and services supplied by a company meet or surpass customer expectation.
3. Every effort should be taken by the organization to seek opinion from ……. employees.

5.2 Customer Perception of Quality

The American Society for Quality (ASQ) survey on the user perceptions of important factors that influenced purchases showed the following ranking:

1. Performance
2. Features
3. Service
4. Warranty
5. Price
6. Reputation and goodwill

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***Performance*:** Performance involves "fitness for use" – a phrase that indicates that the product and service is ready for the customer's use at the time of sale. Other considerations are:

1. Availability, which is the probability that a product will operate when needed;
2. Reliability, which is freedom from failure over time;
3. Maintainability, which is the case of keeping the product operable.

Features: Identifiable features or attributes of a product or service are psychological, time oriented, contractual, ethical, and technological. Features are secondary characteristics of the product or service.

Service: An emphasis on customer service is emerging as a method for organization to give the customer-added value. However, customer service is intangible- it is made up of many small things, all geared to change the customer's perception. Intangible characteristics are those traits that are not quantifiable, yet contribute greatly to customer satisfaction. Providing excellent customer service is different from and more difficult to achieve than excellent product quality.

Warranty: The product warranty represents an organization's public promise of a quality product backed up by a guarantee of customer satisfaction. Ideally, it also represents a public commitment to guarantee a level of service sufficient to satisfy the customer.

Price: Today's customer is willing to pay a higher price to obtain value. Customers are constantly evaluating one organization's products and services against those of its competitors to determine who provides the greatest value. However, in our highly-competitive environment, each customer's concept of value is continually changing.

Reputation: Most of us find ourselves rating organizations by our overall experience with them. Total customer satisfaction is based on the entire experience with the organization, not just the product.

Did u know? Good experiences are repeated to six people and bad experiences are repeated to 15 people; therefore, it is more difficult to create a favorable reputation.

5.2.1 Feedback

Customers continually change. They change their minds, their expectations, and their suppliers.

Notes Customer feedback must be continually solicited and monitored.

Customer feedback is not a one-time effort; it is an ongoing and active probing of the customers' mind. Feedback enables the organization to:

- Discover customer dissatisfaction.
- Discover relative priorities of quality.
- Compare performance with the competition.
- Identify customers' needs
- Determine opportunities for improvement.

Comment Card: A low-cost method of obtaining feedback from customers involves a comment card, which can be attached to the warranty card and included with the product at the time of

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purchase. The intent of the card is to get simple information, such as name, address, age, occupation, and what influenced the customer's decision to buy the product. However, there is very little incentive for buyers to respond to this type of card, and the quality of the response may not provide a true measure of customer's feelings.

Customer Questionnaire: A customer questionnaire is a popular tool for obtaining opinions and perceptions about an organization and its products and services. However, they can be costly and time-consuming.

To make surveys more useful, it is best to remember eight points.

1. Client and customers are not the same.
2. Surveys raise customers' expectations.
3. How you ask a question will determine how the question is answered.
4. The more specific the question, the better the answer.
5. You have only one chance and only 15 minutes.
6. The more time you spend in survey development, the less time you will spend in data analysis and interpretation.
7. Who you ask is as important as what you ask.
8. Before the data are collected, you should know how you want to analyze and use the data.

When writing a survey, it is best to remember that more multiple choice questions can be answered in 15 minutes than open-ended questions. To illustrate this point, compare the following multiple-choice question to the open ended question.

How many times do you dine out in a mouth?

(a) 1 – 2 times

(b) 3 – 5 times

(c) 6 – 10 times

(d) More than 10 times

Focus Group: Customer focus groups are a popular way to obtain feedback, but they too can be very expensive. These groups are very effective for gathering information on customer expectations and requirements.

Surveying a focus group is a research method used to final out what customers are really thinking. A group of customers is assembled in a meeting room to answer a series of questions. These carefully structured questions are asked by a skilled moderator, who probes into the participants' thoughts, ideas, perceptions, or comments.

Toll-Free Telephone Number: Toll-free (800/888) telephone numbers are an effective technique for receiving complaint feedback. Organizations can respond faster and more cheaply to the complaint. Such a number does not, however, reach those who decided not to buy the product or those who discovered some likable feature on a competitor's product. Toll-free numbers are in use by at least 50% of all organizations with sales of at least $10 million.

Customer Visits: Visits to a customer's place of business provide another way to gather information. An organization can proactively monitor its product's performance while it is in the use and thereby identify and specific or recurring problems. Senior managers should be involved in these visits and not delegate them to someone else. However, it is a good idea to take along operating personnel so they can see firsthand how the product is performing.

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Report Card: Another very effective information-gathering tool is the report card.

The Internet Computers: Some managers are beginning to monitor discussions that take place on the internet to find out what customers are saying about their products. Internet users frequently seek advice regarding their everyday activities or activities related to specific interests, hobbies, or sports. Newsgroups, electronic bulletin boards, and mailing list can be scanned using keyword searches if one knows that a company's is of interest to participants in certain activities, hobbies, or profession.

Employee Feedback: Employees are often an untapped source of information. Companies are listening more to the external customer but still are not listening to employee. Employees can offer insight into conditions that inhibit service quality in the organization. Employee groups can brainstorm ideas to come up with solutions to problems that customers have identified.

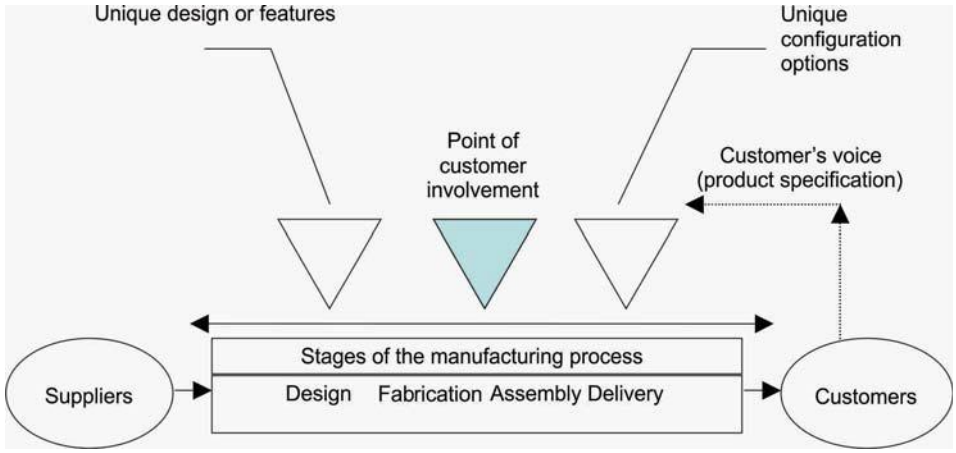
Mass Customization: The ultimate in customer satisfaction is giving customers exactly what they want. In the past, the price tag for this was prohibitive, but mass customization is a way to provide variety at an affordable cost.

Task Prepare a report on the customer feedback on their experience in a public sector bank.

5.2.2 Customer Satisfaction Index

The American Customer Satisfaction Index (ACSI), established in 1994 as a joint project between the University of Michigan and the American Society of Quality, quantifies quality and customer satisfaction and relates them to firm's financial performance.

Figure 5.2: Depiction of Customer Satisfaction Index



The index measures eight sectors of the economy, which include more than 40 industries and more than 200 individuals companies and agencies. The eight sectors of the economy are:

1. Manufacturing (non-durables)
2. Manufacturing (Durables)
3. Retail
4. Transportation, communication and utilities

Notes

5. Finance and Insurance
6. Services
7. Public administration and government
8. E-commerce (adopted in 2000)

Caselet

Use TQM to Improve Customer Satisfaction

A primary focus of TQM and most Quality Management Systems is to improve customer satisfaction by having a customer focus and consistently meeting customer expectations. Customers are almost always satisfied when their expectations are met. When they expect a certain product or service, and you deliver it without problems and at a fair price, you've built a solid customer relationship. Happy, satisfied customers become repeat customers and they provide word-of-mouth marketing – the most powerful kind.

There are three Total Quality Management components that work toward achieving customer satisfaction:

1. It requires that your business understand what customers typically expect in a field, industry, or product line,
2. It ensures your business has the expertise and the resources to consistently deliver the expected product or service, and
3. It emphasizes the need for your business to clearly communicate to the customers exactly what you will deliver to avoid misunderstandings.

TQM provides the quality assurance that customers will get what they expect, as well as a process for managing unsatisfied customers, make needed corrections and prevent similar reoccurrences.

Every business owner and manager knows the importance of satisfied customers, and how expensive it is to find new customers compared to keeping current customers. Business research clearly shows that there is a direct correlation between satisfied customers and revenue. If your business doesn't have a clear path to creating satisfied customers, then it can benefit from TQM.

TQM Improves Business Efficiency and Effectiveness

While focusing on the customer is critical to success, it isn't the only factor. A business can go broke sparing no expense to make customers happy. So not only does a business need to satisfy customers, but it needs to do it in a way that is. A business also has to look within and understand its own operations, another important role of a quality management system.

Total Quality Management places a focus on internal processes, including:

- How processes align to produce desired outcomes to satisfy customers
- How consistently processes deliver desired outcomes (effectiveness)
- The productivity of a process compared the resources used (efficiency)

Being able to consistently produce desired outcomes without wasting resources like time, material, and money is critical for a business to make it over the long haul.

Self Assessment

Notes

Fill in the blanks:

4. …….. is the probability that a product will operate when needed.
5. ……. is the case of keeping the product operable.
6. …… characteristics are those traits that are not quantifiable, yet contribute greatly to customer satisfaction.
7. …… feedback must be continually solicited and monitored.
8. …….. are very effective for gathering information on customer expectations and requirements.
9. Through …….. organizations can respond faster and more cheaply to the complaint.
10. Companies are listening more to the …….. but still are not listening to……. .

Case Study

Hewlett-Packard Company

Have you ever sat down with other people at your company to look for a better way to meet customers' quality needs, only to have been disappointed with the results? The reason for your disappointment may be that one important element was missing from the equation: your customers themselves. Listening to them is what provides real insight into meeting their quality requirements.

While Hewlett-Packard Company's Northwest Integrated Circuit Division (Corvallis, OR) is in business to sell chips to other divisions inside Hewlett Packard (HP), it also serves customers outside of HP. The problem that it faced about five years ago, however, was that many employees either didn't know who their customers were or actually believed that the customers were interfering with them as they performed their work.

Fortunately, management saw the obvious need to address these problems. "We wanted our people to become very familiar with our customers and realise that they were here to serve those customers," says Casey Collett, Ph.D., Total Quality Control manager. "Our goal was to become so responsive to our customers that we would be the only supplier with which they would want to do business."

A Four-step Process

To meet that goal, the Division launched its Total Quality Control effort in 1983. Collett says it involves four steps:

Step 1: On your own, identify what you feel your major business processes are.

Step 2: On your own, determine how you are being measured by your customer.

Step 3: Go out and verify these two perceptions with your major customers.

Step 4: Develop a programme to improve these processes.

To execute these four steps, division management created a small group of TQC experts, who currently report directly to the division manager and work closely with a steering

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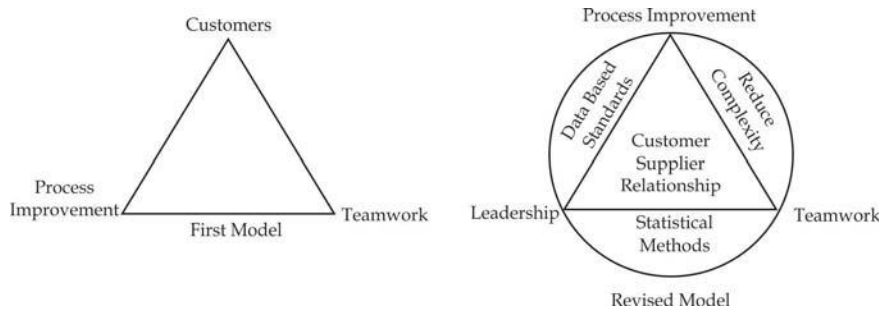
Notes

committee of top managers. TQC members have expertise in manufacturing, teaching, statistics, and group facilitation. Together, the division quality and TQC departments attack customer satisfaction and internal process improvement issues, respectively.

The Division has also created a three-point TQC model, which has expanded to a seven-point model over the years. (See Figure 1)

The customer/supplier relationship is central to the model. Process improvements occur through quality leadership and teamwork. Reducing complexity, setting data-based (meaningful) standards, and using appropriate statistical methods are the tools used to achieve the process improvements

Figure 1: Customer/Supplier Relationship



HP's 10-step Planning Process

The key to achieving TQC from the customer's point of view at HP is a 10-step business planning process pioneered by planning expert Scott Feamster. This process requires the division to understand and analyse each of the following:

1. Purpose
2. Objectives
3. Customers and distribution channels
4. Competition
5. Necessary products and services
6. Plans for necessary products and services (research, manufacturing, financial, and marketing plans)
7. Financial analysis
8. Potential problem analysis
9. Recommendations
10. Next year's tactical plan

The 10-step business planning process, then, is a systematic way of:

- Understanding the business you're proposing to be in;
- Understanding your customers' needs;
- Understanding the market and competitive environment you're entering, and as a result of these understandings;
- Making solid, well-thought-out plans to meet your objectives.

Contd...

Notes

"When you have developed your strategy, you should have an objective, methodical business plan that looks at what customers need and what you are going to do about those needs," says Collett. "Then you can take this document back to the customer and verify its accuracy."

A crucial element of making the 10-step business planning process work is what John Doyle, HP executive vice president for Systems Technology, calls "Imaginative Understanding of Users' Needs" (IUUN). "IUUN is becoming an" integral part of how HP does business," Collett reports, adding that the philosophy of IUUN is to hear what customers say their needs are, and apply the creativity and knowledge you have to create solutions for customers.

Quality Function Deployment

While IUUN is critical to the success of the business planning process, Quality Function Deployment (QFD) is critical to the success of IUUN. QFD is the philosophy of designing your processes in response to customer needs.

"Before QFD, we didn't always realise the importance of understanding customer needs," says Collett. "As a result, we often invented products that we thought people such as ourselves would want, instead of asking our customers what they wanted."

Currently, the Division uses QFD in its R&D and marketing areas. "It helps us find out what our customers need so that we can build these needs into the next generation of our products."

QFD's Planning Matrix

One of the most important tools in QFD is the Planning Matrix. Once you know what your customers' requirements are, the next step is to translate these data into product development plans. The Planning Matrix plots customer requirements on one axis and business processes and their measures or product features on the other axis. The idea is to be able to determine the fit between customer needs and product features. "The Planning Matrix puts a lot more objectivity into the product development process," notes Collett.

Here's How it Works

Down the left side of the matrix are rows of user needs. Across the top of the matrix are columns of product features. With the matrix, you can see where a row intersects with a column and, in that cell, ask yourself if there is a strong relationship, a weak relationship, or no relationship between what the customer requires and what your company is doing.

If you find no relationship on a highly rated need as ranked by the customer, then you need to look at your product design plan and address problem, since the customer considers it important. Conversely, if you are building in steps in the design process that have no bearing on customer needs, you may be able to eliminate them. For example, you may be doing test procedures on something that the customer doesn't care about.

R&D then creates another matrix of customer needs by process control characteristics (or internal manufacturing control characteristics) that will have to be met in order to give customers the features that they want. In Short, the system translates raw customer data into focused activities for helping Marketing, R&D, Manufacturing, and Quality to make the desired product a reality.

Two More Tools for Success

HP uses two other tools to ensure that it is responding to the quality requirements of customers:

Customer Quality Engineers are electrical engineers who work with Marketing to gather customer data, and with R&D and Manufacturing to make sure customer issues are

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Notes

addressed. The task is not always easy. "Clients ask questions in their own terms," says Collett. Customer quality engineers thus need to translate these terms so that answers to their real, often unarticulated problems can be found. Then they need to translate the solutions developed by the division back into language that the customers will be able to understand and utilize.

Process Improvement Teams attack customer issues throughout the Division's team concept. "A few of these teams interface so closely with customer divisions that they ask the customers to be on one of our teams," says Collett. "This certainly gives teams direct feedback from customers."

The teams solve customer problems and then return to customer locations to show them what they have accomplished. "The concept works well, because customers essentially drive the improvement process," she adds.

Focus on the Future

Things have been improving. "Our quality is better, our planning processes are improving, and teams are busy with improvement projects," says Collett. "Sales are up, but we never take customer satisfaction for granted. On an annual basis, we verify with our customers that our processes and the way we are measuring ourselves reflect customer satisfaction. We refine the measures more and more over time to make sure that they accurately reflect what the customer wants."

Questions

1. Why is it important to understand a company's basic business processes in order to deliver Customer satisfaction? Illustrate your answer.
2. How do you determine customers' perceptions of your product or service?
3. What are the basic differences between the first model and the revised model in Figure 1?
4. Explain the necessity for steps 3 and 4 of Hewlett-Packard's 100-step planning process.
5. How would you verify that customers are satisfied? What key result indicators might be used?

Source: Shailendra Nigam, *Total Quality Management*, Excel Books, New Delhi.

5.3 Summary

- There are two distinct types of customers, i.e. external and internal.
- One of the most important factors for the success of an enterprise is its customers.
- Customer satisfaction is a measure of how products and services supplied by a company meet or surpass customer expectation.
- As front line employees are in direct contact with people so they are in a better position to understand a customer's needs and problems.
- Performance involves "fitness for use" – a phrase that indicates that the product and service is ready for the customer's use at the time of sale.
- An emphasis on customer service is emerging as a method for organization to give the customer-added value.
- The product warranty represents an organization's public promise of a quality product backed up by a guarantee of customer satisfaction.

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- Customers are constantly evaluating one organization's products and services against those of its competitors to determine who provides the greatest value.
- Customer feedback must be continually solicited and monitored.
- Some managers monitor the discussions that take place on the internet to find out what customers are saying about their products.
- The American Customer Satisfaction Index (ACSI), established in 1994 as a joint project between the University of Michigan and the American Society of Quality, quantifies quality and customer satisfaction and relates them to firm's financial performance.
- The index measures eight sectors of the economy, which include more than 40 industries and more than 200 individuals companies and agencies.

5.4 Keywords

Comment Card: Comment card is sent out at the completion of each job. This gives us immediate feedback as to the satisfaction of our work.

Customer Satisfaction Index: It is the overall satisfaction rating for the retailers that covers all the key players' individual performances on the satisfaction scale.

Customer Satisfaction: Customer satisfaction means customer's perception of the degree to which the customer's requirements have been fulfilled.

Employee Feedback: Employee feedback is to know opinions of employee about things which happened or not happen in organization

Feedback: Information about reactions to a product, a person's performance of a task, etc. used as a basis for improvement is known as feedback.

Focus Groups: A demographically diverse group of people assembled to participate in a guided discussion about a particular product before it is launched, or to provide ongoing feedback on a political campaign, television series, etc. is known as focus group.

Front Line Employee: Any employee with direct contact with customers and/or with direct involvement with the money making process in their respective company.

Mass Customization: A process whereby small lots of individualized parts or products are produced. The opposite of mass production whereby large numbers of identical parts or products are produced is referred to as mass customization.

Perceived Quality: Perceived quality refers to the consumer's opinion of a product's (or a brand's) ability to fulfill his or her expectations.

Warranty: A written guarantee is issued to the purchaser of an article by its manufacturer, promising to repair or replace it if necessary within a specified period of time

5.5 Review Questions

1. Write a short note on:
   (a) Customer satisfaction
   (b) Customer perception of quality
   (c) Feedback
   (d) Customer satisfaction index
2. Explain customer satisfaction with the help of a diagram.
3. What are the important factors that influence purchases according to American Society for Quality? Explain them briefly.

Notes

4. Briefly explain comment card and customer questionnaire. Which one, in your opinion is the better way of getting feedback?
5. Mention the points which should be kept in mind while making the customer questionnaires.
6. Which is the cheapest methods of getting customer feedback and why? Explain with examples.
7. Why do you think that employee feedback are necessary in organizations?
8. Discuss customer satisfaction index.

Answers: Self Assessment

1. Customers
2. Customer satisfaction
3. Front line
4. Availability
5. Maintainability
6. Intangible
7. Customer
8. Focus groups
9. Toll-free telephone numbers
10. External customer; employee

5.6 Further Readings

Books

Besterfield Dale H. (2011). *Total Quality Management*. Pearson Education.

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Online links

http://www.excellup.com/MBA/tqm/tqm_customer.aspx

http://prr.hec.gov.pk/Chapters/276S-2.pdf

http://totalqualitymanagement.wordpress.com/2008/09/12/customer-focus-and-satisfaction/

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Notes

Unit 6: Service Quality

CONTENTS

Objectives

Introduction

6.1 Definition and Measurement of Service Quality

6.1.1 The Gap Model for Service Quality

6.2 Service Quality and Service Marketing

6.2.1 Defining Quality in Service

6.2.2 Dimensions of Service Quality

6.3 The Cycle of Capability

6.4 Summary

6.5 Keywords

6.6 Review Questions

6.7 Further Readings

Objectives

After studying this unit, you will be able to:

- Discuss the Intangibility of services that makes it difficult to measure quality
- Identify the problem arises out of a gap between expectations and perceived service delivery
- Explain the quality in services as perceived by the customer
- Measure the quality of services gaps in service delivery

Introduction

From the viewpoint of business administration, service quality is an achievement in customer service. It reflects at each service encounter. Customers form service expectations from past experiences, word of mouth and advertisement. In general, Customers compare perceived service with expected service in which if the former falls short of the latter the customers are disappointed. For example, in the case of TAJ Hotels, Resorts and Palaces, wherein TAJ remaining the old world, luxury brand in the five-star category, the umbrella branding was diluting the image of the TAJ brand because although the different hotels such as Vivanta by Taj – the four star category, Gateway in the three star category and Ginger the two star economy brand, were positioned and categorised differently, customers still expected the high quality of Taj from all their properties. The accurate measurement of an objective aspect of customer service requires the use of carefully predefined criteria.

The measurement of subjective aspects of customer service depends on the conformity of the expected benefit with the perceived result. This in turns depends upon the customer's expectation in terms of service, they might receive and the service provider's ability and talent to present this expected service. Successful Companies add benefits to their offering that not only satisfy the customers but also surprise and delight them. Delighting customers is a matter of exceeding their

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expectations. Pre-defined objective criteria may be unattainable in practice, in which case, the best possible achievable result becomes the ideal. The objective ideal may still be poor, in subjective terms. Service quality can be related to service potential (for example, worker's qualifications); service process (for example, the quickness of service) and service result (customer satisfaction).

6.1 Definition and Measurement of Service Quality

There are a lot of challenges that service marketers face due to the basic difference that prevails between service and goods. Some of the challenges that they constantly face are:

- Understanding customer needs and their expectations from service;
- Tangibilising the service offering;
- Dealing with different types and varieties of people - internal as well as external customers - as also the delivery issues;
- Keeping promises made to customers.

But the most intriguing challenge is the measurement and monitoring of quality. Some questions regarding quality of service still elude any definitive answers:

- How can service quality be defined and improved when the product is intangible and non-standardized?
- How can new services be designed and tested effectively when the service is essentially an intangible process?
- How can the service firm be certain that its communication has been effective, consistent and relevant, especially when its other marketing mixes are also communicating? This apprehension is especially true with respect to the role played by the providers in the service transaction.

6.1.1 The Gap Model for Service Quality

This model can help a firm desirous of improving service quality to focus better on its strategies and service processes. This model can not only be used to find and identify areas in service delivery and designs (which might lack quality), but also measure and monitor quality in service.

Quality in service is as perceived by the customer. There is no other way to either comprehend or administer. As service is intangible; the only way to measure quality in service is to measure the expectation of the customer before the receipt of service and measure his perception after the experience, that is, the service encounter. The gap between the two is a measure of the service quality.

Did u know? The larger the gap, the worse is the service quality; the narrower the gap, better the service quality of the firm; i.e., the firm is successful in meeting the customer's expectations... so far!

Since consumer expectations keep inching upward constantly, so must the quality of service.

- the measurement of the expectation of the customers (in this case, students) before the service delivery (before admission)
- the measurement of perception of the experience, after the service encounter (after admission, during the 2-year course and after the convocation)
- thus measuring the gap between the two

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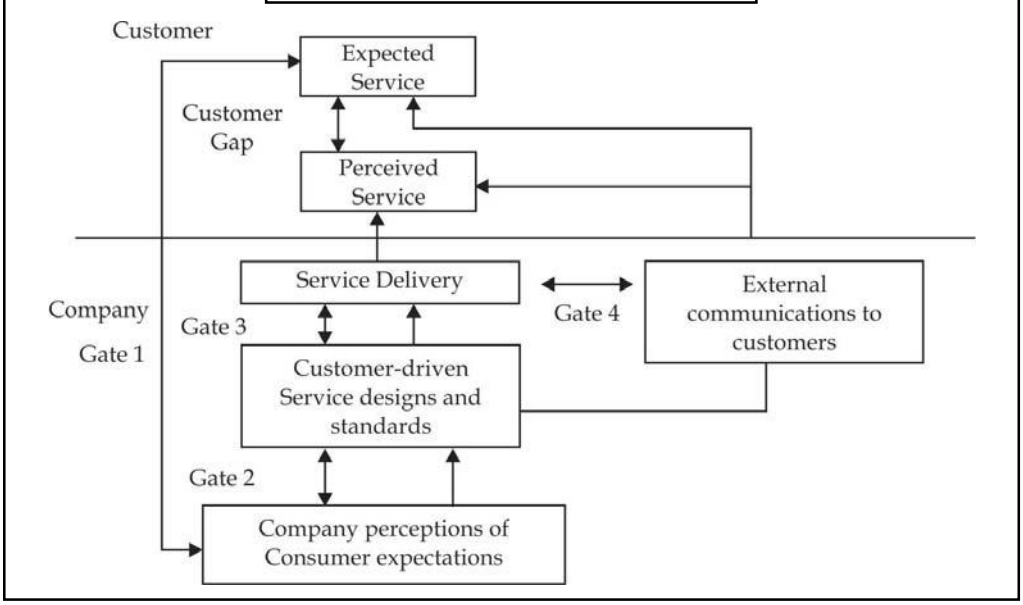
The model professes two types of gaps:

- ***The Customer Gap*** - the gap between customer expectations and customer perceptions. This, in other words, is the service quality shortfall as seen by the customers. Customers develop expectations from receipt of external stimuli from many sources - ranging from those that are company-controlled to social influences. These form the bases of his reference-to-come for the service experience. The customer's perceptions indicate the service as actually received, for all practical purposes, since what we perceive is what is real to us. Perceptions are everything.

Notes Company-controlled external stimuli are: service product/offer, price, advertising, promotions, displays, outlets etc.

Figure 6.1: Gaps Model of Service Quality



Source: R. D. Buzell and B. T. Gale, The PIMS Principle: Linking Strategy to Performance, The Free Press, New York, 1987

Social influences as external stimuli are: word of mouth communications and reference groups. Other influencers of expectations are: personal needs and past experience of the customer. The customer gap indicates the difference between actual performance and the customer's perception of the service. There are a lot of subjective judgments made by customers. Last experiences may prejudice them and change their estimation of quality.

Example: A customer is satisfied with a certain restaurant; but his last experience there (it could be because of a new waiter) could leave him embittered, washing away years of happy experiences at one go.

Caution We are only as good as our last 'Moment of Truth', and what it signified to the customer.

Notes

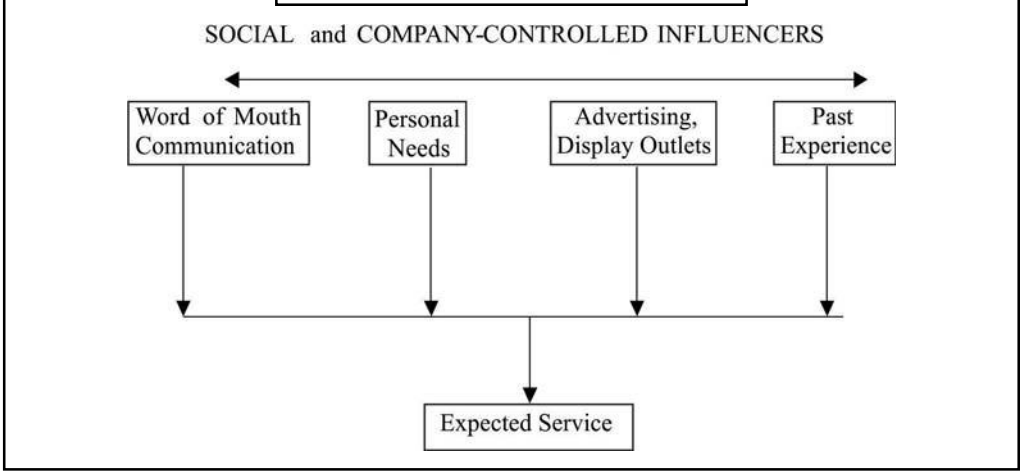
Notes Service quality is all about the responsiveness of an organization to meet the customer's expectations.

The service performance is measured by the perceived service quality. The quality of a service has two components:

- ***Technical quality:*** This is the end result of the service operations process.
- ***Functional quality:*** which is about the process, especially concerning the interaction between the customer and service provider?

Caution These two factors inject a heavy dose of subjectivity into the service process.

Figure 6.2: The customer gap influencers



Source: R. D. Buzell and B. T. Gale, The PIMS Principle: Linking Strategy to Performance, The Free Press, New York, 1987.

Any service organization would be desirous of closing the gap between what is expected and what the customer has received. To them, this would be absolutely necessary to build a long-term relationship with the customer, to retain him. But in order to close the Customer Gap, another type of gap has to be closed: the Provider Gap.

- ***The Provider Gap:*** There are four provider gaps and these in sum total are the cause of the Customer Gap. They are the shortfalls within the service firm. To close the customer gap, the provider gap (or, as also known, Company Gap) has to be bridged. The four provider gaps are:

Gap-1: Customer expectation - management perception gap.

It is the inability of top management to perceive what the customer wants, and is the main reason why a firm cannot meet a customer's expectations. The company is blinded by a perceptual veil of ignorance, arrogance or criminal neglect.

Some of the reasons why Gap-1 can occur are:

- Inadequate marketing research;
- Lack of upward communication in the organization;
- Insufficient focus on relationship building ('don't care' attitude), etc.

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Gap-2: Management perception - service quality expectation gap.

This gap is created in the design process of the service product and lying down of specifications for service quality during service transactions. In the design process, this gap arises during the translation of management's perception of customer-expectation into design specifications. Managers would set specifications for service quality on the basis of what they believe the customer requires — a very dangerous presumption. The implications of this gap are that even if the firm has crystal-clear knowledge and understanding of the customer's expectations, there would be scope for misunderstanding this, leading to setting the wrong specifications, service designs and standards.

Example: A bank would believe that customer friendly interaction is what the customers prefer but the standard would be set on computerization — which is impersonal and neutral. There is no human contact to support the concept of 'friendliness'.

Some reasons for Gap-2 to occur are:

- Failure to connect service design to service positioning
- Unsystematic new-service development process
- Lack of customer-defined service standards
- Absence of a formal process of setting service quality goals etc.

Gap-3: Service quality specifications - service delivery gap.

This occurs at the service provider level when there is deviation from service standards specified and actually delivered to the customers. This probably is the bane of all public sector institutions, be they banks, insurance companies, hotels, travel agencies, hospitals or any such. The management's perception and service design standards might be accurate and perfect. But if the interacting service provider during service delivery falls short of the standards specified, the customer will get an impression of a poorly performing firm. This becomes especially important for that firm that is heavily dependent on people in performing the last transaction. Public sector banks might have the best of design specifications set by Reserve Bank of India; yet late-coming staff, corrupt employees (the Harshad Mehta scam of misuse of Portfolio Management Funds and the internal document mess-up in State Bank of India) would bring large gaps in quality to put it mildly!

Some of the reasons for Gap-3 to occur are:

- Ineffective recruitment, role ambiguity;
- Role conflict;
- Lack of empowerment, control and poor teamwork
- Failure to match supply and demand (in a retail store there would be peak crowds during the evenings and slack demand during the afternoons, but the employee strengths would be the same), customers not co-operating or failing to live up to their roles (lack of knowledge and responsibilities);
- Channel conflicts, etc.

The service firm must ensure that systems, processes and people are in the right place. This will make sure that service delivery is as per the design standards set.

Gap-4: Service delivery - external communications to customer.

This is essentially a communication gap. The gap is the difference between service delivery intention and capability and what is being communicated to the customers. An over-hyped

Notes

communication raises the expectations of the customer - and his benchmark of service quality and his expectations from the service delivery sky-rocket. It will be difficult then for the firm to meet the expectation and there would inevitably be a shortfall. The tragedy is the customers would have been satisfied without the hype. But now they go back with memories of disappointment and are actually dissatisfied. This results from inadequate communication from the firm.

Example: Doordarshan, the much-maligned state TV broadcaster, would announce a certain programme, say an interview with Mr. Amitabh Bachchan, to be broadcast at 7 p.m. and they would fail to do so at that hour - creating huge disappointment. The viewers would curse and would not forgive DD despite an apology - even if one were forthcoming.

The causes of Gap-4 are:

- Lack of cohesiveness in marketing communications;
- Absence of strong internal marketing programme, not being able to meet customers' expectations through communications;
- Over-promising in advertising and personal selling;
- Inadequate horizontal communication between sales and operations;
- Differences in policies and procedures across branches, etc.

After examining ways and means of measuring service quality, what is more important is to establish any relationship, linear or otherwise, between service quality and marketing. This would go a long way to underscore the importance and relevance of measuring quality for services. We have established the following relationships:

- Customer retention and reduced costs (the 'leaking bucket theory')
- Customer satisfaction and customer loyalty, and
- Customer loyalty and profitability (the 'service-profit chain')
- Customer retention and customer net present value.

What remains to be established then are relationships between

- Service quality and profits
- Service quality and service marketing, and
- Service quality and customer service.

If the hypothesis is established that there are evidences of any linear relationships between the variables mentioned above, then customer service should become one of the most important tools for service marketing.

- ***Service quality and profits:*** The Profit Impact of Market Strategies (PIMS) research conducted by Strategic Planning Institute shows that customer-perceived quality is one of the most important variables for profitability and Return on Investment (RoI).

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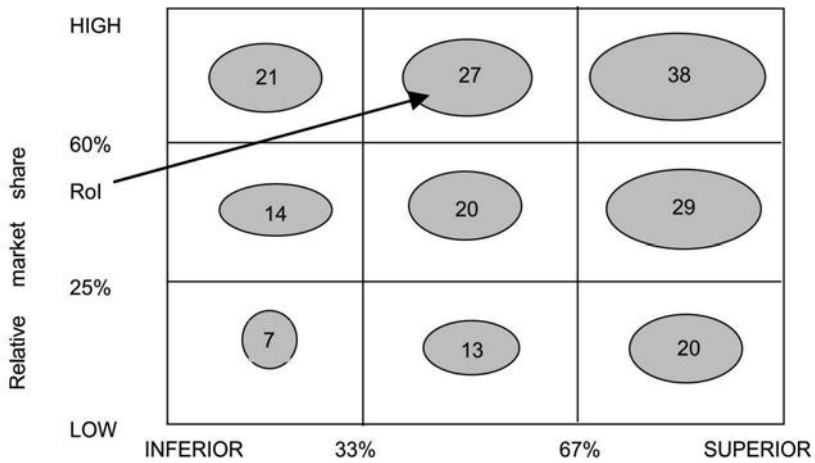
Figure 6.3: Impact of quality and market share on profitability



Source: R. D. Buzell and B. T. Gale, The PIMS Principle: Linking Strategy to Performance, The Free Press, New York, 1987

The findings revealed that the relative perceived quality had a more direct impact on the balance sheet of a firm than that of relative market share. The combination of high relative market share and relative quality gave the highest RoI of 38%. The model makes it possible for the same firm to achieve through medium relative market share (implying lower costs) and very high relative quality, a high RoI of 29% (see Figure 6.3).

Other research focused on fifty top service firms, establishing that firms that are known for high quality service earned more (with an average return on investment of 8 percentage points) than low quality service providers.

Task In what ways can a retail bank attempt to measure the quality of its services? Compare the process with a five-star hotel and a business school.

Caselet

Measuring Perceived Service Quality Using SERVQUAL: A Case of the Croatian Hotel Industry

Perceptions of hotel service quality are the degree to which hotel guests find various hotel attributes important in enhancing their satisfaction with the hotel stay. In the present study, it was revealed that the main dimensions of perceived service quality in hotels are 'reliability,' 'empathy and competence of staff,' 'accessibility,' and 'tangibles.' Two of these are similar to the servqual model, while others overlap with the original servqual dimensions. However, the studies conducted in the hotel sector identified different outcomes with regard to the number and interpretation of dimensions guests use to assess perceived hotel service quality. Akan (1995) reported a seven-dimension structure, labeled as 'courtesy and competence of the personnel,' 'communications and transactions,' 'tangibles,' 'knowing and understanding the customer,' 'accuracy and speed of service,' 'solutions to problems' and 'accuracy of hotel reservations.' Wong Ooi Mei et al. (1999) identified 'employees,' 'tangibles' and 'reliability' as key dimensions of service quality in

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the hospitality industry. Moreover, Choi and Chu (2001) reported the following seven dimensions: 'staff service quality,' 'room qualities,' 'general amenities,' 'business services,' 'value,' 'security' and 'idd facilities,' Markovi´c (2003) identified a three-dimension solution, interpreted as 'empathy and assurance of hotel staff,' 'reliability,' and 'physical quality.' This implies that the number and definition of the dimensions depend on the measurement context.

Furthermore, the findings of this study reveal that among the four dimensions, 'reliability' has emerged as the most important predictor of perceived service quality. In the hospitality industry, this dimension refers to solving guests' problems, performing error-free service at the promised time, providing prompt service, and convenient opening hours of hotel facilities. This finding is similar to Knutson et al. (1991) and Juwaheer's (2004) research conducted in hotel settings. The indicators of factor and reliability analyses are also consistent with similar studies conducted in the hospitality industry. The proposed factor structure of the present study, as well as in the studies conducted by Choi and Chu (2001) and Markovi ´c (2003) have explained the rather high percentage of variance in original data – 65.1 per cent, 67.2 per cent and 73.9 per cent, respectively. The Cronbach alpha values are 0.95 (this study), 0.94 (Choi and Chu 2001) and 0.92 (Markovi ´c 2003) and indicate high reliability of the instruments. It can be concluded that the modified version of the servqual model is suitable for use by hotel managers in gaining easily interpretable and reliable data on hotel guests' attitudes regarding perceived service quality. The results of this study suggest that solving guests' problems, performing error-free service, employees' attitude, appropriate location, and the appearance of the facilities are the key attributes for a hotel's success on the Opatija Riviera. Thus, the findings can be used as a guide for hotel managers to improve crucial quality attributes and enhance service quality and business performance. There are several limitations that need to be acknowledged. The data were collected in a small although important tourist destination in Croatia. The questionnaires were distributed during the summer months. Thus, the results' interpretation should be limited to this group of hotel guests. It is possible that guests staying in hotels out of the main tourist season might have different perceptions of the service quality. Also, the measurement of hotel guests' perceptions was limited to 29 hotel attributes. Even though these attributes were included in other studies as well, there could be other relevant hotel attributes that are likely to influence hotel guests' perceptions. In order to be able to generalize the findings, it is suggested that similar studies be conducted in other Croatian tourist destinations as well. Moreover, this study was focused only on hotels. Future research should test whether the factor structure proposed in this study is valid in other types of accommodation in the region (e. g. camps, private accommodation, hostels). Additionally, future research could also assess hotel staffs' perceptions of service performance and compare them with guests' perceptions in order to identify the differences.

Source: http://www.google.co.in/url?sa=t&rct=j&q=manage+quality+customer+service+case+study&source=web&cd=42&cad=rja&ved=0CEMQFjABOCg&url=http% 3A%2F%2Fwww.dlib.si%2Fstream%2FURN%3ANBN%3ASI%3ADOC-IKJ6YVOF%2F0c8456c9-118d-4c35-8ecc7b15c5e77339%2FPDF&ei=FLBeUfGjD4vLrQfWrYDAAQ&usg=AF QjCNG5p4fvNGFlaYJ0Xe5lB4ybSXvLXg&bvm=bv.44770516,d.bmk

Self-Assessment

Fill in the blanks:

1. .....model can help a firm desirous of improving service quality to focus better on its strategies and service processes.
2. As service is .....; the only way to measure quality in service is to measure the expectation of the customer before the receipt of service.
3. The ..... is the gap between customer expectations and customer perceptions.

Notes

4. ..... is all about the responsiveness of an organization to meet the customer's expectations.

5. A ..... communication raises the expectations of the customer - and his benchmark of service quality and his expectations from the service delivery sky-rocket.

6. If the hypothesis is established that there are evidences of any ..... between the variables, then customer service should become one of the most important tools for service marketing.

6.2 Service Quality and Service Marketing

In services, marketing and operations overlap to a great extent. Thus quality of service would imply management of quality of all service marketing mixes. Taking a leaf from manufacturing and goods, issue of quality in services is an issue of survival and competitive advantage. Just as shoddy goods have no sales, acceptance or viability, poor service quality will find survival difficult in a highly competitive market-place. To briefly illustrate the reasons for the importance of quality in services:

- ***Lower costs:*** Higher quality of services imply fewer mistakes for any repeat tasks, service recovery exercises or refunds to disgruntled customers. A preventive and corrective measure through quality control processes lowers costs and increases productivity.
- ***Immune or less vulnerable to price war:*** Service firms known for their high quality services have an additional differentiating attribute and can avoid the service commodity trap. They can afford to have a higher price as they offer more benefits than the competition.
- ***Higher customer loyalty:*** service quality ensures customer satisfaction that drives customer loyalty and enhanced profits.
- ***Higher market share:*** Loyal customers contribute to positive word-of-mouth publicity (the 'buzz effect'), which broadens customer base with minimal costs.
- ***Loyal internal customers:*** Employees become proud of the firm for which they are working; having a sense of belonging is known for inspiring and delivering high quality services. Lower attrition level lowers manpower and training costs and the service firm can leverage on the knowledge and skill of its employees.
- ***Higher RoI:*** The service-profit chain shows that high quality services contribute to higher profitability.

Caution We have now established the base for defining quality in service as well as for discussing models to measure quality.

6.2.1 Defining Quality in Service

In manufacturing, quality is defined by the degree of compliance between stated goals and achieved targets. It is therefore rather easy to measure and conform to a standard. In service it becomes difficult to comprehend the concept of quality and measure it. This is due to the mother of all characteristics for services – the intangibility factor – and it makes measurement and assessment of service quality extremely challenging. Perception of service quality is, additionally, felt by all parties involved in a service delivery process: service providers, customers and suppliers. They should therefore understand each other's definitions of service quality.

Notes

Quality can be viewed from multiple perspectives:

- ***Product-based:*** The definition is based on measurable parameters. It is suitable for goods, but becomes a challenge in services. The number of times a telephone rings before the receiver is picked up by a service provider can be a basis of measuring responsiveness.

Example: Domino's Pizza has successfully positioned itself as a firm, which promises to deliver its fare in half an hour - in other words, giving measurable parameters for quality.

- ***User-based:*** This definition is from the customer's perspective, reinforcing the notion that "quality is in the eyes of the beholder". An extremely well-read professor following all the guidelines of teaching can be condemned with "poor" rating if the students are not able to comprehend the accent, or if the delivery is uninteresting. This element of subjectivity raises a challenge: that of finding out:
  - What the customer expects,
  - Which attributes to be included for garnering the largest appeal from the largest group of customers, and
  - How to differentiate between those attributes that provide satisfaction and those that imply quality.

This approach begins where product-based quality definition ends.

- ***Manufacturing-based:*** This is conformance based and quality is perceived as an outcome of production processes. Output is considered to be of high quality if it conforms to design specifications. This factor is controllable by the service firm but does not take into consideration customer satisfaction.
- ***Value-based:*** This definition equates quality with value. The service provider will have to strike a balance between conformance and performance, evaluating benefits and price to customer satisfaction.
- ***Transcendental:*** Quality can only be experienced but can neither be described nor documented rendering it impractical for quality managers. Tourism is one such area where quality can, to some extent, be only experienced directly.

Quality in service has two-window viewpoints: internal and external to the service firm. Internal quality is all about the entire service delivery process—from concept to encounter/experience/transaction/consumption. While internal quality is all about conformance and compliance to design standards, external quality is about the customer's perception. While the former can be controlled by the service firm, service quality is as perceived by the customers - and should be measured from that perspective. All aspects of 'marketing myopia' rear their ugly heads again when any service quality measurement is based on the manager's opinions of the customer's expectations:

- Service firms may not know the specific criteria for decision-making in service consumption
- Management may be myopic on the way customers evaluate performance of the competitive products
- Marketing myopia might creep in and make management blind to the differing and evolving needs of the consumers. The need evolution could be due to market and environmental factors, competitive response and technological advances.

Notes

Notes We give below the formal definition of quality:

Quality is "the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs."

6.2.2 Dimensions of Service Quality

We will discuss two works, both of which will give the totality of dimensions to service quality.

David A. Garvin

Eight dimensions of quality were identified by Garvin:

1. ***Performance:*** Every product is supposed to deliver benefits and the measure of its quality is performance of the offer. A dish scourer, which can clean plates completely and quickly, would be a performance measure.
2. ***Features:*** These are in addition to the core product, which do not come as standard 'features' but as add-ons.
3. ***Reliability:*** This is a measure of the degree of probability of the product delivering what had been promised.
4. ***Conformance:*** Delivery quality meeting design standards.
5. ***Durability:*** This is a measure of the length of time that a product can deliver benefits, without deterioration.
6. ***Serviceability:*** If the product can be repaired with ease and speed then it is a measure of quality. It could include the behavioural dimension of service personnel, e.g., their politeness.
7. ***Aesthetics:*** This is a measure of the product's looks, design, touch and feel.
8. ***Perceived quality:*** Consumers develop a perception due to company-controlled stimuli like advertising, publicity and brand promotion, and social effects like word-of-mouth.

A Parasuraman et al

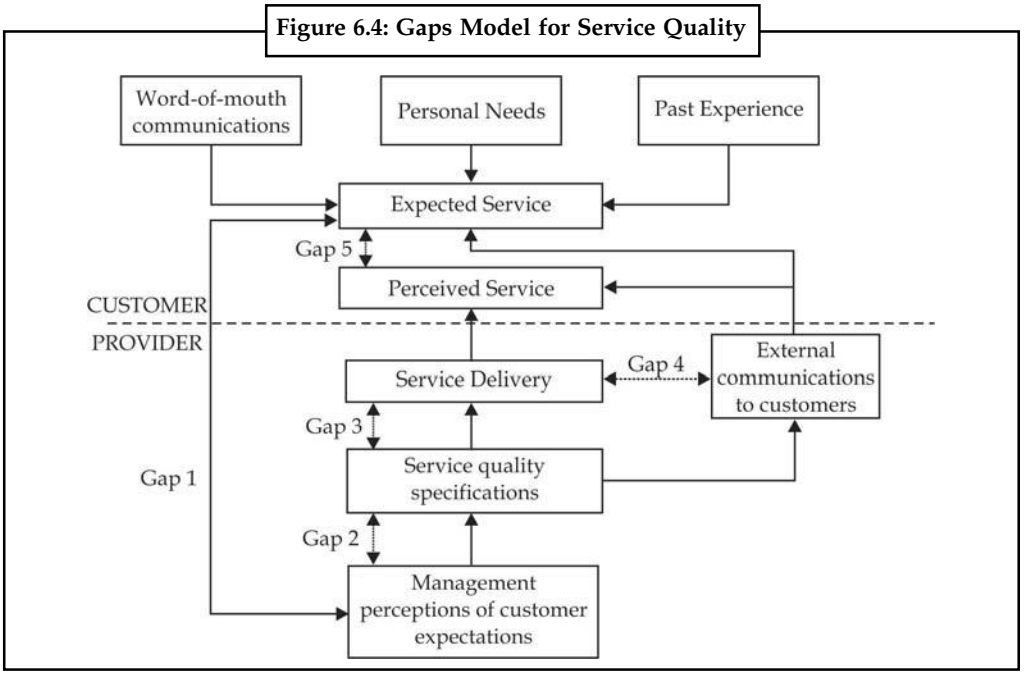
Parasuraman, Valerie Zeithaml and Leonard Berry identified five dimensions with which consumers judge services.

1. ***Reliability:*** The service should be performed with dependability, and as per its promise.
2. ***Responsiveness:*** This concerns the attitude of the service provider to be willing to provide service. It also includes their sensitivity as well as timeliness in responding to customer requests.
3. ***Assurance:*** This relates to the knowledge, skill and competence of the service providers. It also indicates their ability to generate trust and faith, and also capability in service delivery with politeness and consideration.
4. ***Empathy:*** This dimension relates to the caring, feelings as well as the ability to give personalized service.
5. ***Tangibles:*** This is a measure of the effectiveness of the physical evidence of the service provider like design layout and facilities.

Notes

They asked over 1900 customers of five well-known national companies to allocate 100 points across the five service dimensions. They developed a model of service quality called the "gaps model". They came up with a way to measure service quality by measuring these 'gaps' through a 22-item questionnaire called SERVQUAL. Following is the gaps model for measuring quality in services (Figure 6.4)

Figure 6.4: Gaps Model for Service Quality



The Customer Gap is caused by the totality of all the Provider Gaps.

Gap #5 = Gap #1 + Gap #2 + Gap #3 + Gap #4

The Gap model helps a marketer to locate service failures, isolate them, measure their intensity and then attempt service recoveries. Service quality is as perceived by the customers, which can now be measured. It helps to a great extent to overcome all those drawbacks that service marketing has to contend with arising out of their unique characteristics like intangibility, variability and inseparability.

Self-Assessment

Fill in the blanks:

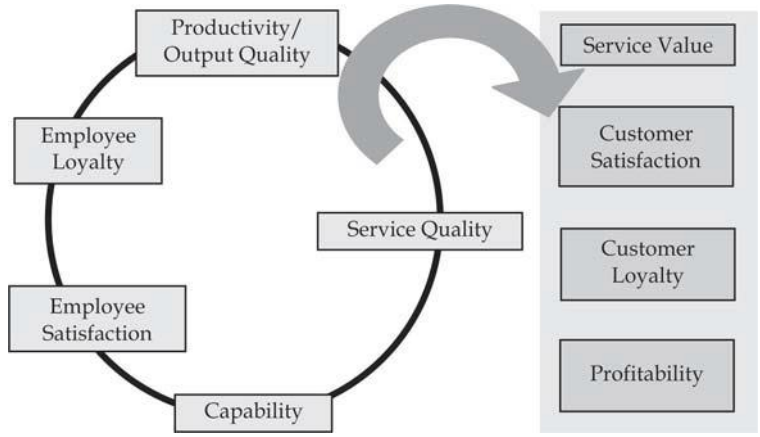
7. A preventive and corrective measure through quality control processes lowers ..... and increases..... .
8. In manufacturing, quality is defined by the degree of compliance between stated goals and ..... .
9. ..... is based on measurable parameters.
10. ..... is from the customer's perspective, reinforcing the notion that "quality is in the eyes of the beholder".
11. ..... is all about the entire service delivery process—from concept to encounter/experience/transaction/consumption.
12. ..... is "the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs."

Notes

6.3 The Cycle of Capability

Measuring and maintaining service quality goes on to reduce variability and increase consistency of service delivery and the total capability of the firm. This has a great and positive impact on employee satisfaction, which greatly lowers attrition levels. The higher loyalty factor reduces training costs while increasing productivity and the quality of output. The last only go, to increase the benchmark of performance whose maintenance will reflect on its competitive advantages and positioning, brand value and profitability (see Figure 6.5).

Figure 6.5: Cycle of Capability



Source: R. D. Buzell and B. T. Gale, The PIMS Principle: Linking Strategy to Performance, The Free Press, New York, 1987

Other methods of achieving service quality:

The works of quality gurus like W. Edwards Deming, Joseph M. Juran, and many others were instrumental in developing a new philosophy in quality management called TQM. It highlights the following, which have been dealt with in detail elsewhere:

- Focus on customers
- Leadership
- Creating a learning organization
- Participation and team work
- Empowerment and recognition
- Benchmarking
- Strategic approach
- Objective measurement and management
- Quick response
- Continuous improvement
  - ISO 9000 Standards
  - Malcolm Baldrige National Quality Award Programme

Task How can you use the 'Gaps Model for service quality' for a package delivery firm like AFL/DHL? Compare it with that of a tourist resort.

Notes

Self-Assessment

Fill in the blanks:

13. ..... relates to the caring, feelings as well as the ability to give personalized service.
14. Measuring and ..... goes on to reduce variability and increase consistency of service delivery and the total capability of the firm.
15. The ..... helps a marketer to locate service failures, isolate them, measure their intensity and then attempt service recoveries.
16. A way to measure service quality by measuring these 'gaps' through a 22-item questionnaire called ..... .

Case Study

Central Bazaar Measuring Quality of Intangibles and Experiences

Central Bazaar is a popular upcoming direct-to-home shopping service in South India. It offers goods and services ranging from provisions, home maintenance, groceries, toiletries, beauty, health and home deliveries, exchanges etc. Its service was offered initially to the residents of New Delhi and Gurgaon, and then went on to include other towns.

It was a bold new experiment in electronic retailing format, tried for the first time in India, where customers ordered for their merchandise either through the net or the telephone. A 24-hour service delivery concept, it involved selling branded goods at a one per cent discount to maximum retail price (MRP), and unbranded goods at a five per cent discount to existing rates. Central Bazaar was cautious in using the web as an exclusive method for taking order, following the bust of dotcoms in 2000 and the bad name that e-commerce had earned. In addition, it set up call centres, which became the mainstay for receiving orders, and which was more in the comfort zone of the housewives.

The Central Bazaar model, then, was that of an online Kirana store, where the line was defined as telephone as well as website. The 'store' did not have an outlet where customers could come and shop; instead, all orders were to be booked through the phone or its website, with the company promising 24-hour delivery.

The process of ordering from Central Bazaar: The customer has to call up the call centre. There is a very efficient and trained team, at the service of the customers, ready to take down their orders. Here, Information Technology has helped the call centre to a great extent. Central Bazaar has a system where the call centre, the warehouse and the despatch centre are all well integrated with each other. There is effective and efficient flow of information across all these levels.

All the products that are available with Central Bazaar are stored in a database, complete with the recent prices and quantity and also the promotions carried out by different companies, while also featuring Central Bazaar's exclusive offers. Thus, when a customer calls up the call centre, he/she is given all the information, right from the product quantities available, prices, offers and also the amount of money that the customer saves.

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The call centre agents have all the knowledge about the product, i.e., the product features, its quality, its uses, etc. Thus, they are in a position to inform the customers correctly about the various aspects of the products that are being ordered. In case of any product not being in stock, the call centre agents are immediately informed about it, so that they can suggest alternative products to the customer. The order is delivered at the customer's house at the time convenient to the customer, free of cost. Not only does this process put the customer at ease, it gives her the much-needed convenience as regards both of time and place.

The processing of the order: Once the order is confirmed and the customer decides the time of delivery, the order is forwarded to the warehouse department. This department is responsible for getting the order ready for despatch. This department prepares a list of the items in the product and gives it to a person who does the "shopping". The warehouse is very methodically designed. There are different markings for different racks for easy identification of the items. So the "shopper" moves around the warehouse picking up the items in the list. At the end, an invoice is prepared and the items are packed in totes and then sealed.

Despatch operations: Once the list is given to the "shopper", the orders are sorted according to the area of delivery and by the time of delivery. Once the totes are packed and sealed, they are arranged in the despatch centre according to the different areas of delivery. The despatch centre is very well organised, by way of separate markings for different areas of delivery.

Central Bazaar has an efficient team of delivery vans and drivers at their disposal and also a very efficient team of delivery boys. They are provided with proper training as to how to deal with customers, the different modes of payment, and the different coupons acceptable by Central Bazaar, etc. They are regularly evaluated on various parameters like politeness towards the customer, cleanliness of merchandise and service delivery, consent to keep the items, the ability to satisfactorily respond to the queries of the customers, etc.

Delivery operations: The orders are loaded in the vans according to the knowledge of the drivers about the respective areas. This saves a considerable amount of time required to search for the correct address. Thus the delivery reaches the customer's house on time. The mode of payment is either by cash or credit cards and that too only at the time of delivery.

Advantage Central Bazaar: The format had many apparent advantages:

For customers:

- ***24x7:*** It was designed to be a genuine 24 hours, seven days-a-week shopping experience. This gave the customers a unique option - especially those who did not want to be tied to the commercial establishments' framework. It was a promise of genuine empowerment.
- ***Impersonal:*** Shoppers, especially women, were embarrassed to ask the kirana store keeper for personal hygiene products like sanitary napkins, contraceptives, and inner wear. The Central Bazaar format of ordering on the phone or through the web made it impersonal and avoided embarrassment for the shoppers.
- ***Shopping assistance:*** The call centre had agents who were trained to provide all assistance to buyers. To help deal with any first time apprehensions, Central Bazaar can also send a customer service agent to a customer's house to help set up an online shopping service facility that was fully customized to their individual needs.
- ***Home delivery:*** Central Bazaar catered to convenience shopping, with the facility of ordering from home coupled with free home delivery. This was especially useful in

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Bangalore and Chennai, where, due to overt dependence on public transport such as Rapid Mass Transit System (commuting electric train service!), it was next to impossible for the customers to shop and then carry the bulky parcels home during the rush hour.

- ***5000 brands:*** The electronic retailer, with over 5000 brands, offered a wide choice of varieties and assortments of products, to cover the widest possible customer base. It also was the intention of the retailer to be a one-stop-shop for home products.
- ***Special promotions:*** Central Bazaar offered not only the usual promotions of the FMCG vendors but also its own store promotions. This helped in not only setting the tone of differentiation amongst other retailers but also in communicating its enhanced value propositions.
- ***EDLP:*** The pricing strategy of Central Bazaar was Every Day Low Price, meaning that all merchandise was available every day at a one per cent discount to maximum retail price (MRP), and unbranded goods at a five per cent discount to existing rates. This was a competitive advantage on price that was hard to ignore.

For Central Bazaar:

Adapting to the changing demographics of family, gender, income, occupation, education, etc. urban India in general and Mumbai in particular, have been witnessing perceptible shifts in their demographic profile. Joint families are giving way to nuclear families for various reasons:

- ***Lack of living space:*** With increase in family size across three generations, it was about time for the new family to relocate itself.
- ***Job opportunities:*** The new generation got a job in another part of the megalopolis, and preferred to stay close to the work area instead of commuting. New Bangalore was a classic case. It was fast becoming an institutional hub for BPOs, educational institutions and, of course, IT companies.
- ***Individualism:*** The new generation and the new family were reluctant to conform to the joint family code and sought a greater degree of individual expression in respect of food, interior décor, child rearing as well as lifestyle.

Additionally, women were joining the workforce in larger numbers. Dual income meant not only more scope for conspicuous consumption, but also less time for leisure and shopping. The convenience offered by online shopping was irresistible, freeing time for leisure and self-developmental activities. This new generation customers were more educated and aware, and recognised brands and their promise better than the previous generation. They did not feel the need to compare shopping products and were comfortable ordering through the phone or net.

Central Bazaar felt that they were offering the market just the right kind of format, considering the changing demographics. With the family spending more time in their occupation, commuting, and lifestyle changes, ordering on the phone was one more of the adaptive behaviours.

- ***Escaping the location trap:*** "Location, location, location" was the call sign for any retailer. Its decisive competitive advantage lay in the right location choice, which brought in the much sought after footfall and took advantage of the "traffic". Location by defining the catchments area for the store was a strategic issue. Central Bazaar escaped the location trap by being "accessible" 24*7 to all people in the designated suburbs of Mumbai: a phone call or a "click" was all it took to order, and the merchandise was delivered by the retailer's vans right at the doorstep.

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Notes

- *No inventory:* Central Bazaar does not exactly escape the inventory trap, but manages to do better than other offline stores. It has a huge godown and warehouse, where it stocks its 5,000-brand merchandise line-up, and from which its "pickers" select the order items. What it escapes from is expensive interior décor, visual display and merchandising, shoplifting, etc.
- *Micro marketing:* The delivery system enables Central Bazaar to get close to the customer's living environment for further interactions and micro marketing. The sales call can become customised and the customer's eyeball and attention can be garnered exclusively and qualitatively for effective marketing and relationship building.
- *Customer psychographics:* Receiving orders on the net or through the phone and delivering the merchandise to their homes gives Central Bazaar an incomparable advantage over other retailers in customer analysis. It has access to hitherto unavailable data on the customer, including not only his demographic profile but also his psychographics. Central Bazaar can now track the customer's purchase patterns, know his preferences, and get a glimpse of his perceptions, personality as well as his attitude. This would undoubtedly make him tailor and customise his retail marketing, including merchandise and promotion offers, retail communication, and other value-added services.

Problem for Central Bazaar

Mr. Joseph Mathew, General Manager, Central Bazaar had a problem. He wanted, with evangelical zeal that the unique service format should succeed. He not only wanted Central Bazaar to have a distinctive market presence and mind share but also garner revenues, market share and market size. He fully understood that there existed a linear relationship between customer satisfaction and profitability. He dreaded the possibility of having dissatisfied customers; but he was more scared; by the fact that he had no way of accessing basic data about the dissatisfied customers; such as:

- Who they were
- Which aspect of Central Bazaar's service they were dissatisfied with
- the degree of their dissatisfaction

Also, he realised, ensuring consistent service delivery implied was a way towards the quality goal. His biggest problem was not only in measuring the quality of service delivery, its consistency and customer satisfaction at Central Bazaar but also in finding comparable benchmarks. He knew that customers compared stores, formats and different aspects of the service retail-mix like merchandise, locations, layout, promotions and other communications and the behaviour of the retail personnel. He also knew that this comparison was crucial in building their preferences. Central Bazaar was a unique e-tailer, with no known direct competition. He was up against retailers with different formats - supermarkets, kirana stores and discount stores - but fighting for the same customers' share of wallet and heart share. The undeniable fact was that the shopping experience in Central Bazaar was definitely different from that of other "offline" format stores. 'How do you compare oranges with mangoes!' he thought.

Question

Can you find ways and means to measure quality in intangible offerings like services?

Source: C Bhattacharjee, (2009), "Services Marketing," Excel Books

Notes

6.4 Summary

- There are a lot of challenges that service marketers face due to the basic difference that prevails between service and goods.
- Gap Model for Service Quality model can help a firm desirous of improving service quality to focus better on its strategies and service processes.
- Quality in service is as perceived by the customer. There is no other way to either comprehend or administer.
- Social influences as external stimuli are: word of mouth communications and reference groups. Other influencers of expectations are: personal needs and past experience of the customer.
- Service quality is all about the responsiveness of an organization to meet the customer's expectations. The service performance is measured by the perceived service quality.
- There are four provider gaps and these in sum total are the cause of the Customer Gap. They are the shortfalls within the service firm. To close the customer gap, the provider gap (or, as also known, Company Gap) has to be bridged.
- After examining ways and means of measuring service quality, what is more important is to establish any relationship, linear or otherwise, between service quality and marketing.
- In services, marketing and operations overlap to a great extent. Thus quality of service would imply management of quality of all service marketing mixes. Taking a leaf from manufacturing and goods, issue of quality in services is an issue of survival and competitive advantage.
- Measuring and maintaining service quality goes on to reduce variability and increase consistency of service delivery and the total capability of the firm. This has a great and positive impact on employee satisfaction, which greatly lowers attrition levels.
- The works of quality gurus like W. Edwards Deming, Joseph M. Juran, and many others were instrumental in developing a new philosophy in quality management called TQM.

6.5 Keywords

Customer Gap: The gap between customer expectations and customer perceptions. This, in other words, is the service quality shortfall as seen by the customers.

***Functional Quality*:** Includes which is about the process, especially concerning the interaction between the customer and service provider.

Product-based: The definition is based on measurable parameters. It is suitable for goods, but becomes a challenge in services.

Profit Impact of Market Strategy (PIMS): The Profit Impact of Market Strategy (PIMS) database "yields solid evidence in support of both common sense and counter-intuitive principles for gaining and sustaining competitive advantage"

Return on Investment (RoI): A performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. To calculate ROI, the benefit (return) of an investment is divided by the cost of the investment; the result is expressed as a percentage or a ratio.

Service Quality: Service quality is a comparison of expectations with performance. A business with high service quality will meet customer needs whilst remaining economically competitive.

Notes

Technical Quality: Includes which is the end result of the service operations process.

User-based: This definition is from the customer's perspective, reinforcing the notion that "quality is in the eyes of the beholder".

6.6 Review Questions

1. Extending from the Total Product Concept, discuss the reasons why quality has become an increasingly important issue in services marketing.
2. Give examples of the methods by which a public sector bank can seek to manage quality.
3. Distinguish between the concepts of 'functional' and 'technical' quality.
4. Critically assess the usefulness of the SERVQUAL technique for measuring quality in an industry of your choice.
5. In what ways can the personnel input to services be managed in order to achieve more consistent quality standards?
6. What is the implication of 'the PIMS Principle' for a bank? Does it hold true for a tourist resort? Explain the rationale for your answer.
7. Enumerate the different benefits that a Business Process Outsourcing firm can derive from applying quality standards in its processes.
8. Explain the validity for the 'Gaps Model' to be based on two essential gaps.

Answers: Self Assessment

1. Gap Model for Service Quality
2. Intangible
3. Customer Gap
4. Service quality
5. Over-hyped
6. Linear relationships
7. Costs, productivity
8. Achieved targets
9. Product-based
10. User-based
11. Internal quality
12. Quality
13. Maintaining service quality
14. Empathy
15. Gap model
16. SERVQUAL

Notes

6.7 Further Readings

Books

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Notes

Unit 7: Customer Retention

CONTENTS

Objectives

Introduction

7.1 Customer Retention Strategies

7.1.1 Negative Retention Strategies

7.1.2 Positive Retention Strategies

7.2 Trends in Customer Retention

7.3 Keys for Customer Retention

7.4 Customer Loyalty

7.5 Strategic Customer

7.6 Customer Involvement in Product/Service Development

7.6.1 New Product/Service Development

7.6.2 Different Types of Customers

7.7 Summary

7.8 Keywords

7.9 Review Questions

7.10 Further Readings

Objectives

After studying this unit, you will be able to:

- Define customer retention
- Discuss trends in customer retention
- Explain the techniques used for customer retention
- Explain customer loyalty
- Explain Strategic customer

Introduction

Customer retention is the key to any organization's effectiveness. Customer centric approach to marketing program helps retain customers and win back lost customers. An organization needs to study the needs of the various market segments and design the marketing programs tailor made to suit the segments. Customer anticipates several things from the company in addition to the product; which the firm has to study well to bridge the gaps between customer expectations and firm's delivery. Emergence of competitive environment resulted in a series of customer focused (quality centered) management approaches. Thus the quality and productivity have become synonymous and the employee-centered (internal customer) focus on change management such as QC, Kaizen, TQM, Zero defects etc., have come into play.

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7.1 Customer Retention Strategies

The dynamics of the business ecosystem have changed the way in which companies do business both in relationship management and the streamlining of their operations. Relationship marketing is emerging as the core marketing activity for businesses operating in fiercely competitive environments.

Did u know? On an average, businesses spend six times more to acquire new customers than to keep them. Therefore, many firms are now paying more attention to their relationships with existing customers to retain them and increase their share of customer's purchases.

The practice of relationship marketing also has the potential to improve marketing productivity through improved marketing efficiencies and effectiveness.

Customer retention is the activity that a selling organization undertakes in order to reduce customer defections. Successful customer retention starts with the first contact an organization has with a customer and continues throughout the entire lifetime of a relationship. A company's ability to attract and retain new customers, is not only related to its product or services, but strongly related to the way it services its existing customers and the reputation it creates within and across the marketplace.

Customer retention is more than giving the customer what they expect, it's about exceeding their expectations so that they become loyal advocates for your brand. Creating customer loyalty puts 'customer value rather than maximizing profits and shareholder value at the center of business strategy'. The key differentiator in a competitive environment is more often than not the delivery of a consistently high standard of customer service.

An important distinction can be made between strategies that lock the customer in by penalizing their exit from a relationship, and strategies that reward a customer for remaining in a relationship. The former are generally considered negative, and the latter positive customer retention strategies.

7.1.1 Negative Retention Strategies

Negative customer retention strategies impose high switching costs on customers, discouraging defection.

In a B2C context, mortgage companies have commonly recruited new customers with attractive discounted interest rates. When the honeymoon period is over, these customers may want to switch to another provider, only to discover that they will be hit with early redemption and exit penalties. Customers wishing to switch retail banks find that it is less simple than anticipated: direct debits and standing orders have to be reorganized. In a B2B context, a customer may have agreed a deal to purchase a given volume of raw material at a quoted price. Some way through the contract a lower cost supplier makes a better offer. The customer wants to switch but finds that there are penalty clauses in the contract. The new supplier is unwilling to buy the customer out of the contract by paying the penalties.

Some customers find that these switching costs are so high that they remain customers although unwillingly. The danger from CRM practitioners is that negative customer retention strategies produced customers who feel trapped. They are likely to agitate to be freed from their obligations, taking up much management time. Also, they may utter negative word-of-mouth. They are unlikely to do further business with that supplier. Companies that pursue these strategies argue that customers need to be aware of what they are buying and the contracts they sign. The Total Cost of Ownership (TCO) of a mortgage can include early redemption costs.

Notes

When presented with a dissatisfied customer who is complaining about high relationship exit costs, companies have a choice. They can either enforce the terms and conditions, or not. The latter path is more attractive when the customer is strategically significant particularly if the company can make an offer that matches that of the prospective new supplier.

In the following section we look at a number of positive customer retention strategies, including meeting and exceeding customer expectations, finding ways to add value, creating social and structural bonds, and building commitment.

7.1.2 Positive Retention Strategies

It is very difficult to build long-term relationships with customers if their needs and expectations are not understood and well met. It is a fundamental precept of modern customer management that companies should understand customers, then acquire and deploy resources to ensure their satisfaction and retention. Customers that you are not positioned to serve may be better served by your competitors.

Exceeding customer expectations means going beyond what would normally satisfy the customer. This does not necessarily mean being world-class or best-in-class. It does mean being aware of what it usually takes to satisfy the customer and what it might take to delight or pleasantly surprise the customer. You cannot really strategize to delight the customer if you do not understand the customer's fundamental expectations. You may stumble onto attributes of your performance that do delight the customer, but you cannot consistent efforts to delight customers show your commitments to the relationship. Commitment builds trust. Trust begets relationship longevity.

Customer delight occurs when the customer's perception of their experience of doing business with you exceeds their expectation. In formulaic terms:

$$\text{Customer delight} = P > E$$

Where P = perception and E = expectation.

This formula implies that customer delight can be influenced in two ways: by managing expectations or by managing performance. In most commercial contexts customers expectations are ahead of perceptions. In other words, customers generally can find cause for dissatisfaction. You might think that this would encourage companies to attempt to manage customer expectation down to levels that can be delivered. However, competitors may well be improving their performance in an attempt to meet customer expectations. If your strategy is to manage expectations down, you may well lose customers to the better performing company. This is particularly so if you fail to meet customer expectations on important attributes.

Customers have expectations of many attributes.

Example: Product quality, service responsiveness, price stability, and the physical appearance of your people and vehicles.

These are unlikely to be equally important. It is important to meet customer expectations on attributes that are important to the customer. Online Customers, for example, look for rapid and accurate order fulfillment good price, high levels of customer service and website functionality. Dell Computers believes that Customer retention is the outcome of their performance against three variables: order fulfillment on time, in full, no error, product performance and after sales service. The comments in parentheses are the metrics that Dell uses.

Kano has developed a product quality model that distinguishes between three forms of quality. Basic qualities are those that the customer routinely expects in the product. These expectations are often unexpressed until the product fails.

Notes

Example: A car's engine should start first time and the sunroof should not leak.

The second form is linear quality. These are attributes of which the customer wants more or less; for example, more comfort, better fuel economy and reduced noise levels. Marketing research can usually identify these requirements. Better performance on these attributes generates better customer satisfaction. The third form is attractive quality. These are attributes that surprise, delight and excite customers. They are answers to latent, unarticulated needs and are often difficult to identify in marketing research. As shown in Figure 7.1, Kano's analysis suggests that customers can be delighted in two ways: by enhancing linear qualities beyond expectations and by creating innovative attractive qualities.

A number of companies have adopted 'customer delight' as their mission, including Cisco, American Express and Kwik-Fit, the auto service chain. Others pay homage to the goal but do not organize to achieve it. In the service industries customer delight requires frontline employees to be trained, empowered and rewarded for doing what it takes to delight customers. It is in the interaction with customers that contact employees have the opportunity to understand and exceed their expectations. The service quality attributes of empathy and responsiveness are on show when employees aim to delight customers.

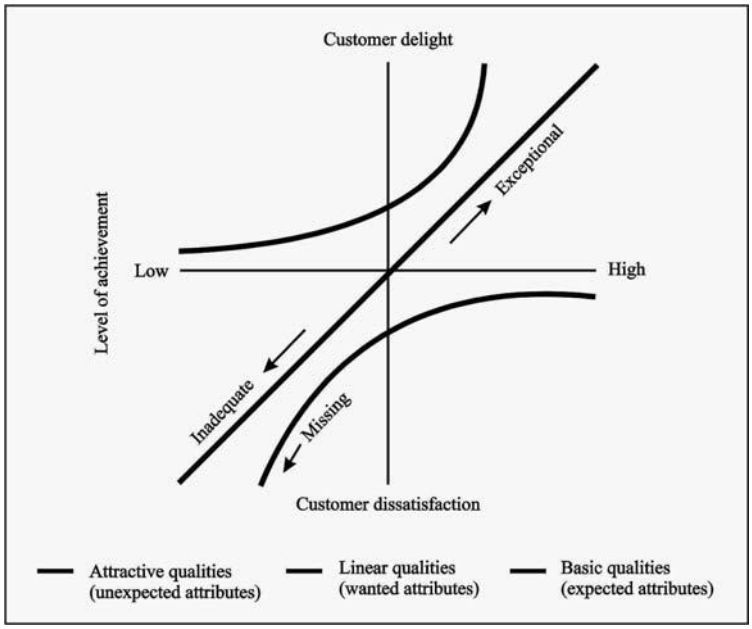
Exceeding expectations need not be costly.

Example: A sales representative could do a number of simple things like volunteer to collect and replace a faulty product from a customer rather than issuing a credit note and waiting for the normal call cycle to schedule a call on the customer.

Offer better, lower cost solutions to the customer, even though that might reduce margin.

Provide information about the customer's served market. A packaging company, for example, might alert a fast-moving consumer goods manufacturer customer to competitive initiative in the market.

Figure 7.1: Customer Delight through Product Quality



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Customer retention is not only a cost effective and profitable strategy, but in today's business world it's necessary. This is especially true when you remember that 80% of your sales come from 20% of your customer and clients. With these statistics I am wondering why most marketing and sales campaigns are designed for the new customer.

Take for instance the wireless telephone companies; if you sign a new contract you are given a large rebate or even a free cellular telephone. If you are a current customer you have the privilege of paying full price. Can someone please explain this methodology? With this type of promotion are we not just pushing current customers and clients to seek services elsewhere when their contract ends?

Perhaps we need to rethink our marketing and sales strategies, after all many experts will tell you that it's five times more profitable to spend marketing and advertising dollars to retain current customers than it is to acquire new customers. In years past the importance of focusing on customer retention was not as important, stickiness came naturally. We shopped in our neighborhood shops and our corner grocery stores. We had a personal connection with our service providers and the thought of shopping at another store would have never crossed our minds.

That has all changed now. Our stores are larger, the majority of the sales personnel don't know that you even exist. Not to mention that now we have the convenience of the Internet and do a large portion of our shopping online, where you are known by your email address. As a result, customer loyalty has disappeared and large corporations and virtual storefronts are unable to ask the millions of disloyal customers what caused them to stray.

However, there is a solution. Sophisticated technology and database equipment has made it possible for specialized firms to make attempts at customer retention through database marketing programs. Establishing a detailed client database will allow these companies to keep track of personal information and individual preferences of all their customers. This enables them to provide better service and value. Just like the corner grocery store owner kept information on 200 customers in his head, the large superstore can now keep track of 20,000 customers through its customer database. With effective implementation of customer databases, companies will be able to reestablish contact with customers, and will be able to work successfully towards increasing customer retention, repeat sales, and customer referrals.

Caution To achieve the objectives of the database and customer retention programs, the entire campaign should be designed and carried out with the customer in mind.

The exercise will only be effective if the customer recognizes and associates some value with being part of your database. If they do not perceive value in your program all of your communications, coupons, special offers, and newsletters will be discarded. Your customers have been inundated with meaningless "junk" mail and email spam, so embed your campaign with value.

A few value-adding strategies that you can use include:

- Membership cards and programs that entitle your customers to special offers, discounts, or preferential treatment.
- Welcome, acknowledgement, sales recognition, thank you statements.
- After sales satisfaction and complaint inquiries and surveys.
- Event oriented communications in which the customer is genuinely interested.
- Enhanced and empowered customer, after sales, and technical support.

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Everyone wants to retain their existing customers. Few companies, however, are implementing positive strategies aimed at retention. Most companies are organized for acquisition. Their advertising and sales programs are designed to find and promote their products and services to new customers. The companies are organized on a product or brand basis, not on a customer segment basis. While they all have customer service departments, and most have a customer service toll free number, they lack an integrated marketing strategy that is directed at retention, and that defines retention as the measurement of success. In this article, we will explore the meaning of a retention strategy, showing how it can be set up, and how lifetime value can be used to measure it.

You have often heard it said that "It is five times more profitable to spend your marketing dollars to retain the customers that you have than to use the dollars to beat the bushes for new customers." Most people would agree with this statement, even though they have no way of proving it. Indeed, the majority of large American and Canadian firms today are experimenting with database marketing programs aimed, in large part, at retention. Most of these companies are not yet sure whether their experiments will be successful. A significant number of the programs will fail and ultimately be scrapped. How do such programs work? Let's look at the theory.

The proprietor would meet you at the door. He knew you by name. He knew your preferences. He would put things aside for you. He built his business through recognizing his customers and doing favors for them. Customers were loyal to these stores because of the recognition and personal attention they received. These small stores have been virtually wiped out through the advent of supermarkets. Supermarkets have a much wider variety of goods. The average grocery store had 800 SKUs on their shelves. Supermarkets today have 30,000 SKUs. Mass marketing took over. Prices came down. Variety increased. Food purchases fell from 31% of the average family budget in 1950 to about 10% today; yet the food we buy with that 10% is better in quality and quantity to what we bought with 31% in 1950. We have all gained.

Most dimensions of quality and the customer's pursuant sense of satisfaction are not permanently established at the time of exchange (transaction point). As the provider maintains post-transactional control over certain dimensions, it is possible to manage the customer's perceptions of quality.

Caselet

Blocks to Customer Focus

Despite all proclamations, catchy advertising slogans, and customer service publicity, service levels have improved only marginally in the last few years. As Harvard Business School professor, Rosabeth Moss Kanter, puts it "Despite the recent media coronation of King Customer, many customers will remain commoners... most businesses today say that they serve customers. In reality, they serve themselves."

The problem is that most organizations only talk about customer service improvement. Many executives don't understand what outstanding customer service really looks, aren't ready to turn their organization inside out to provide it, are trying to paint happy smiles on their frontline service providers, or are bolting a customer service programme on the side of their organization rather than making it a part of their core strategy.

Here are some of the biggest reasons that so few organizations successfully turn their customer service rhetoric into reality:

1. ***Little or no segmentation of markets and customer groups:*** The organization is trying to be everything to everybody. Customers are lumped into one

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indistinguishable mass and their expectations (if they've been gathered at all) aren't weighted, ranked, and segmented.

2. ***Little or no customer data:*** When it is collected (such as an occasional survey) positive feedback is acknowledged. But negative data is denied (usually by challenging the survey methodology). Budget priorities are set, cost containment initiated, and resources allocated with little, if any, systematic connection to customer priorities and expectations. Improvement activities are focused on what the organization or management considers important.

3. ***The organization is managed from the inside out:*** New products and services are pushed out to the market through sales and marketing. Customers aren't involved as active partners in research and development activities. A senior executive in a leading computer company once said, "If customers don't like our solutions, they have the wrong problems".

4. ***Employees are treated as the source of service breakdowns:*** Training and motivational campaigns (such as recognition programmes) aim to "fix the frontline". Management pays little attention to all the research that proves "The 85/15 Rule" — 85% of service breakdowns originate in organizational systems, processes, or structures.

   Internal customer tyranny runs rampant. Departments that are served by other departments use the concept of "internal customer-supplier relationships" to get their own needs met, whether or not it improves external customer service.

5. ***Blurry line of sight to external customers:*** Many organizational members (other than those on the front serving lines) have little interaction with external customers and often don't understand (and have little reason to care about) customers' expectations and how their work ultimately helps or hinders meeting those expectations.

6. ***One customer group dominates:*** For example, the focus is on retailers, agents, or distributors with scant attention paid to the ultimate consumer. Little effort is made to understand and balance the needs of both groups while pulling products and services through the distribution or service chain.

7. ***Focus is on customer acquisition rather than retention:*** Investments in sales and marketing to bring in new customers are much higher than efforts to retain or expand business with current customers.

Customers aren't people. Thinking of someone as a customer implies providing service, partnership, or some form of equality. However, when customers become "policyholders", "consumers", "patients", "passengers", "taxpayers", "accounts", or "advertisers" they often become less human.

Business is a lot like tennis, those who don't serve well end up losing. In a recent interview, Bob Green, a service/quality coordinator with AmSouth Mortgage in Birmingham Alabama summed up the challenge facing most organizations, "The financial products from one mortgage company to another are basically the same. We're out to play 'quantum leapfrog' and jump out in front of our competitors. The only way we can do that is to know our customers overall needs more thoroughly and move more quickly to meet them than anybody else in our business."

Source: http://www.managerwise.com/article.phtml?id=264

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Self Assessment

Fill in the blanks:

1. Customer …….. is the key to any organization's effectiveness.
2. …… marketing is emerging as the core marketing activity for businesses operating in fiercely competitive environments.
3. Customer retention is the activity that a selling organization undertakes in order to reduce customer…… .
4. …… customer retention strategies impose high switching costs on customers, discouraging defection.
5. The …….. of a mortgage can include early redemption costs.
6. Exceeding customer …… means going beyond what would normally satisfy the customer.
7. Sophisticated technology and database equipment has made it possible for specialized firms to make attempts at customer retention through…….. .
8. Most companies are organized for……... .

7.2 Trends in Customer Retention

Retaining and developing customers has long been a critical success factor for businesses. In that sense, Customer Relationship Management is not new, previously falling under the guise of customer satisfaction. Worldwide, service organizations have been pioneers in developing cause retention strategies.

1. ***Innovative Measures:*** Banks have relationship managers for selected customers, airlines have frequent flyer programs to reward loyal customers, credit card companies offer redeemable bonus points for increased card usage, telecom service operators provide customized services to their heavy users, and hotels have personalized services for their regular guests. It is, however, with the rapid rise of new entrants into the market place and increased competition that companies in other sectors have recognized the business potential within a captured base.
2. ***Improved Operating Performance:*** Sluggish growth rates, intensifying competition and technological developments businesses induced to reduce costs and improve their effectiveness. Business process re-engineering, automation and downsizing reduced the manpower costs. Financial restructuring and efficient fund management reduced the financial costs. Production and operation costs have been reduced trough Total Quality Management (TQM), Just in Time (JIT) inventory, Flexible Manufacturing Systems (FMS) and efficient Supply Chain Management (SCM).
3. ***Increased Focus:*** However, reduction in costs alone is no longer enough or is necessarily an effective strategy. In facing the competitive threats, such as new entrants, pricing pressures, technology along with the related costs and also including the time lags in procuring, maintaining and strengthening one's market, more and more organizations are realizing that the traditional marketing model is no longer effective. With a flood of new entrants offering quality products and services at lower prices, many sectors have been turned into commodity markets. In a market place where loyalty has plummeted and the cost of acquiring new customers is prohibitive, companies have turned to their current customers in an attempt not only to retain them but also to exploit the potential within. This has enabled them not only to respond to the threats in their market place but also positioned the strategically to take advantage of the opportunities available.

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7.3 Keys for Customer Retention

Some of the techniques used in organizations to retain their customers are:

1. ***SFA (Sales Force Automation):*** CRM also incorporates enhanced sales force automation (SFA) functionality. SFA puts account information directly in the hands of field sales staff, making them responsible for maintaining it and thus helps them to be more productive. Now, as part of CRM, SFA is also focused on cultivating customer relationships and improving customer satisfaction.
2. ***TQM (Total Quality Management):*** TQM has been another driving force. TQM is aimed at improving quality and reducing costs. The TQM philosophy has been prevalent in many companies, which find it necessary to involve both suppliers and customers for implementing TQM at all levels of the value chain. Companies like IBM, Motorola, General Motors, Xerox, Ford and Toyota are consistent users of TQM and hence also of CRM. Other programs like JIT supply and MRP (Material Resource Planning) have also made for the use of interdependent relationship between supplier and customer.
3. ***SSA (Systems Selling Approach):*** SSA is yet another factor which has become more common with the advent of digital technology and complex products. The systems selling approach involves the integration of parts, supplies and the sale of services along with a particular capital equipment. In the capital goods market, customers appreciate the idea of system integration. Sellers have been able to sell augmented products and services. This has also been extended to consumer packaged goods and services sector.
4. ***KAM (Key Account Management):*** Another offshoot of CRM has been the development of key Account Management Program as some companies insisted upon new purchasing approaches like national contracts and master purchasing agreements to be adopted by vendors.
5. ***SCM (Supply Chain Management):*** Regarding suppliers' loyalty, again it has been observed that it pays more to develop closer relations with a few suppliers than to deal with more vendors. More often marketers find it beneficial to retain existing customers for life rather than making a one-time sale to several new customers.
6. ***GAMP (Global Account Management Programs):*** An extension of CRM is reflected in the emerging trend of large internationally oriented companies to become global. For this purpose, such companies are seeking the assistance of vendor's cooperating and collaborating solutions for global operations. This has made it obligatory for markets interested in the business of global companies, to adopt CRM programs, particularly global account management programs.
7. ***KM (Knowledge Management):*** Knowledge about customers is a prerequisite for CRM. Indeed, in depth knowledge of the customer's habits, desires, needs and the analysis of their cognitive effective behavior and attributes need to be applied through CRM to develop and design marketing strategies as well as to develop ad cultivate interaction and relationship with customers for mutual benefit.

Task Take any organization of your choice. Research on the various techniques implemented by them to retain their customers and to what degree have they succeeded in that.

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Finally, it is recognizable that customers' expectations have changed significantly in recent years. With the advent of new technology and increased availability of new and advanced product features and services, consumers are least prepared to compromise their preferences for quality of products/services. Cross selling and up selling are possible to a greater extent for customers, if they are loyal and committed to the firm and its offerings.

Self Assessment

Fill in the blanks:

9. Business process re-engineering, automation and downsizing reduced the ……. costs.
10. SFA puts ……. directly in the hands of field sales staff.
11. The …….. approach involves the integration of parts, supplies and the sale of services along with a particular capital equipment.
12. Knowledge about customers is a prerequisite for…… .

7.4 Customer Loyalty

Building customer loyalty is the basic platform of relationship formation. In a highly competitive and challenging business environment, organizations are really blessed if they are fortunate to have loyal customers in their customer inventory. With the backup of loyal customers, the organization could enjoy a number of advantages. In short, having loyal customers will serve as a sustainable competitive edge to the organization concerned in the present day context. Therefore, organizations should keep "building customer loyalty" as their prime agenda.

Customer loyalty is a company's ability to retain satisfied customers. Maintaining customer loyalty is one of the toughest challenges for any marketing department in a business enterprise, since the wants of a customer are modified at much faster rate than their needs. It requires a business enterprise to follow a proactive approach that includes formulating strategies for brand consolidation, researching and continuing with new product development, following TQM (Total Quality Management), implementing CRM systems, and also, working out Pipeline Management tactics.

A customer loyalty program is based on a simple premise: as a company develops stronger relationships with their best customers, those customers will stay with the company longer and become more profitable.

Since every marketer wants customers, a logical question to ask is "what affects customer loyalty". The factors that affect the customer loyalty are: (a) Customer satisfaction, (b) Emotional bonding, (c) Trust, (d) Choice reduction and habit and (e) History with the company.

Customer Satisfaction: People develop belief about what they expect to happen before they make a choice. Customer satisfaction is a post-purchase or post-choice evaluation that results from a comparison between those pre-purchase expectations and actual performance. Fulfillment of an expectation is confirmation. If there is a disconfirmation expectations are not met. Dissatisfied customers may complain, choose never to purchase the transactional experience is thus seen to result in confirmation or disconfirmation yet for most organizations, the goal is to measure and manage customer satisfaction with the cumulative experiences customers have with the brand, product, organization, or location.

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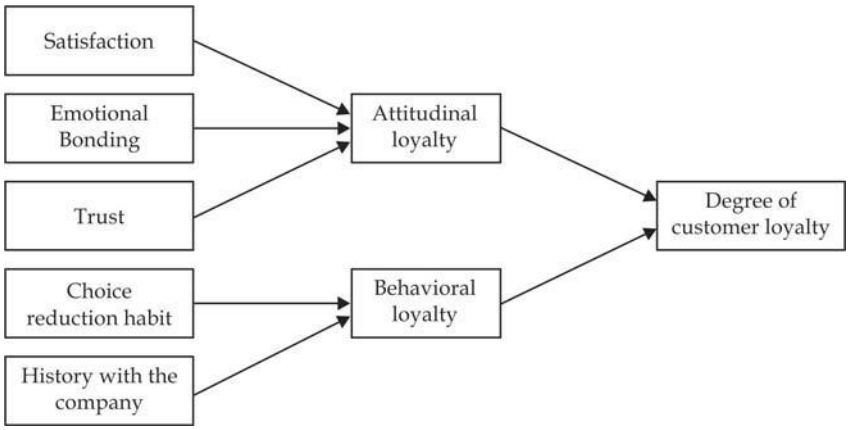
Figure 7.2: Factors affecting Customer Loyalty



Effective marketers try to understand if the discrepancy between expectations and performance is large or small. The term delightful surprises has been use to describe situations in which customer receive fulfillment that exceeds the satisfaction of unexpected needs or wants. A delightful surprise may be a defining moment in which a regular customer becomes a loyal advocate. Effective marketers likewise try to understand the degree of discrepancy when marketers fail to meet expectations and the causes of consumer dissatisfaction.

Satisfied customers may not be loyal customers. One explanation is that expectations, which shape satisfaction, are complex and exist at different levels. People may formulate expectations in terms of a desired level – what should be done – and in terms of an adequate level – what will be done. Many marketers believe customers have a zone of tolerance where expectations range from what they hope to receive to what is minimally in a study of satisfaction. The company ranked satisfaction on a 5-point scale ranging from 1 for completely dissatisfied to 5 for completely satisfied. It found that customers who rated their satisfaction as 4 were six times more likely to switch to a competitive offering than those who marked 5 were. So, while satisfaction is important in knowing what shapes loyalty, we have to go deeper to fully understand loyalty.

Why do satisfied customers often switch brands or buy from other companies? There are several explanations. The first is that a company's satisfied customer might also have a positive experience with and be equally satisfied with a competitor's offering. Thus relative satisfaction should be considered in the role that customer satisfaction plays in shaping customer loyalty. Another has to do with familiarity and a need for variety. People may simply opt for a experience because they get less and less satisfaction from the old one. A third explanation is that new information changes customer expectations about a previously untried offering.

Emotional Bonding: The second component of the model shown in Figure 7.2 builds on the idea that, over time customer loyalty requires emotional bonding. Customers have a positive brand affect, which is an affinity with the brand, or they have a company attachment, which means they like the company. In many circumstances, consumers may identify with and become emotionally attached to mental images that a company or a brand develops or acquires.

Example: Many customers identify with Polo Ralph Lauren. They identify with the brand because the brand identifies them and their friends. From a consumer's perspective the brand equity associated with Polo leads to customer loyalty.

Brand equity is the value of the brand name associated with a product or service that goes beyond the functional aspect alone. For instance, many customers feel a closeness with other people who also use the good or service.

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Some companies know how to connect emotionally with their customers while others have more difficulty in accomplishing this level of commitment.

Notes CRM must reach beyond the idea of the rational consumer and strive to establish feeling of closeness, affection, and trust as true emotional bonding is often based on trust and respect.

Trust: Trust, the third component of the model, is interrelated with emotional bonding. Trust exist when one party has confidence that he or she can rely on the other exchange partner. Trust can be defined as the willingness of the customer to rely on the organization or brand to perform its stated function. Trust reduces uncertainty/risk and is viewed as a carefully thought out process, whereas brand affect may be an instantaneous response. In many situations, trust means a customer believes that the marketer is reliable and has integrity. In many personal selling situations, trust means that a customer has confidence that the sale representative is honest, fair and responsible and that his or her word can be relied on. If a delivery date is given the buyer has confidence that the product will be shipped on time. When there is trust in a relationship, all partners believe that none will act opportunistically. Marketers, especially the marketers of services, establish trust by maintaining open and honest communication and by keeping the promises they make.

Choice Reduction and Habit: Contrary to traditional economic theory, consumer research shows that people have a natural tendency to reduce choices. In fact consumers like to reduce their choices to a manageable set, usually not more than three. People feel comfortable with familiar brands and well known situations that have been rewarding. Part of customer loyalty, such as the absence of brand switching behavior is based on an accumulation of experiences over time. With simple repetition we become familiar with a brand, store, company, Web site, or search engine. We develop habits that result in continuity. For example, it has been estimated that consumers go to the same supermarkets up to 90 percent of the time.

There can be a switching cost associated with change to the unfamiliar, the untried or the new. There may be a cost in time, money, or personal risk. In other words, as the adage "if it ain't broke, don't fix it" suggest there may be a perceived risk in change. Perceived risk means the customer may be uncertain about the consequences of making a purchase. There may be perceived performance risk or social risk. The customer may think the new brand will not perform as well as the current brand. The customer may believe his/her friends will not like the new brand as well.

History with the Company: A final component of customer loyalty involves the customer's history with the company. One's history with the company influences one's habits. But we should draw a distinction between repeat behavior and contact history with the company and its image. A positive corporate image – the perception of the organization as a whole – can have a favorable impact on customer loyalty, creating habitual responses to the company name itself. Wal-Mart, for example is known for everyday low prices while another department store, such as Nordstrom, may be known for excellent customer service. Thus, perceptions of the company's historical image can impact customer intentions, loyalty and likelihood of buying. The CRM system, however, is usually more focused on a customer's actual purchasing history.

Self Assessment

Fill in the blanks:

13. Building customer …….. is the basic platform of relationship formation.
14. …… try to understand if the discrepancy between expectations and performance is large or small.

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15. ……. is the value of the brand name associated with a product or service that goes beyond the functional aspect alone.

16. ……. can be defined as the willingness of the customer to rely on the organization or brand to perform its stated function.

17. ……. means the customer may be uncertain about the consequences of making a purchase.

7.5 Strategic Customer

Customer interaction channels encapsulate all the possible ways of interacting with customers. This comprises a mix of old legacy channels such as call centers, mail, sales force, and new channels such as mobile, Internet, voice automation, and interactive TV. The issues here are which of the new channels will provide an efficient means of improving customer access and convenience, and which of the "old" channels need to be re-engineered to improve customer service and cost effectiveness. Internet could fall in either category for some companies. Internet sales and service capabilities are still to be implemented, whilst for others these are in place but failing to achieve their potential.

Create a Synchronous Customer Strategy: This should be one of the first activities in a CRM program. Initially prepared in outline it evolves and expands as new capabilities are implemented and new customer information becomes available. It is important to start with at least an outline strategy, as this will help to ensure that all subsequent design and implementation activities are totally focused on achieving specific customer goals with quantifiable business value. A customer strategy comprises set of strategic goals that will provide initiatives that can be applies to customers in identifiable segments to achieve the overall objective of sustained profitable growth.

Typical Elements of a Strategy: Obtaining high value customers to improve market-shares; rewarding the best customers; to improve loyalty ranges of sleeping customers to reduce agitation; stimulation of occasional customers to bring more frequent contact; cross-selling to frequent low-value customers to improve share of wallet reduction of cost to market, sell, and serve to low-value customers; migrate frequent customer on to lower cost channels. The ability to create intuitively sound actionable segmentation is important. It is important to segment customers for a meaningful CRM. An enterprise should start by examining what data is available or is going to be available and use common sense to determine the level of segmentation that will be possible.

Prioritize Initiatives: The next step is to prepare the business case. This will entail assessing the commercial impact of the customer strategy in terms of growth of customer base, development of customer relationships, and reduction of service costs. This should be carried out in a detailed manner such that the value of different elements can be evaluated. This will help support the prioritization of development of initiatives. This prioritization will also allow a phased implementation plan to be created, which will generate an early-benefits stream whilst moving towards the goal of a fully functional CRM capability. The plans will typically involve three types of activity: (i) Quick wins – activities that rollout existing best practices across the business; (ii) Short-term developments – initiatives that can exploit the existing infrastructure to create benefits quickly; and (iii) Long-term developments – detailed design and implementation activities that will create the technical infrastructure, processes, and an organization that will finally support the fully functional capability.

Measurement of the Customer: CRM will to be able to deliver significant benefits with a good data. However, this can bring significant challenges. Effective target marketing, for example, depends on the availability of discriminatory information on customers. To do well, a good mix of demographic, psychograph, geographic, behavior, and attitudinal information may be

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required. This could mean implementation of new capabilities to strengthen the ability to measure the customer. In certain situations where customer transactions are infrequent or non-descriptive, third party information might be employed, acquired through affinity partnerships, or purchase of commercially available data.

Adopt a Piloting Study: CRM business cases are often highly theoretical, and it can be unclear how well a solution element will work in practice. The careful implementer will adopt a piloting approach where, critical elements are tried out in the field prior to commitment to full roll out. This will also help to refine the solution and expose significant problems and organizational issues at an early stage. Repeat problems will also give the opportunity to think about how to apply the technology to improve the processes, thereby leading to an entirely new way of working.

Customer Performance Measures: The presence of good, concise management reports describing all aspects of the customer base can be invaluable in helping to refine the customer strategies and shape future precuts services and promotional activities. Such customer performance measures would typically describe the size and value of key customer segments, profile, the behavior and attitude of the segments, and track how the value, behavior and attitude is changing in response to CRM initiative.

Full Range of Technology: Rapidly advancing technology means e-structuring ways in which how business is to be conducted. New communications technology connects remote employees with the rest of the enterprise; the internet deepens self-service options; telephone advances make virtual call center operations possible; call centers or website provide selling opportunities by marketing products that are relevant to the individual. An effective CRM program makes technology a base to be used in an iterative process that considers what technology can do for an organization and vice versa.

Assess Package Solutions: Given the importance of making the right CRM technology choices, sorting through the endless applications on the market today can be intimidating and frustrating. Applications should be sorted by the broad view of functionality including, communication channels and IT platforms supported and size of company they fit the best.

Caution Consideration should also be given to vendor viability in terms of financial stability and service and support capabilities.

No single vendor currently provides all the required applications, so users typically must patch together a set of components to fit the overall solution requirement.

Skills and Organizational Implications: In implementing CRM capabilities, attention must be paid to addressing people, process and organizational issues as well as technological needs. For example, the analysis of customer information, to achieve customer segmentation and target marketing initiatives are rarely successful without the involvement of experienced statisticians who are trained to develop and apply their skills whilst being driven by business requirements.

Proactive Leadership: At its best, CRM combines the information, systems, policies, processes, and employees of an enterprise in a unified effort to identify, attract, and retain profitable customers. Clearly, no single department can drive the cross-functional process changes required to achieve a well-defined customer focus. CRM must be achievement within the fabric of a company, not bolted on to it. This means has CRM initiatives must be planned at the top and implemented from the boardroom.

Self Assessment

Notes

Fill in the blanks:

18. A …….. comprises set of strategic goals that will provide initiatives that can be applies to customers in identifiable segments to achieve the overall objective of sustained profitable growth.
19. It is important to ……customers for a meaningful CRM.

7.6 Customer Involvement in Product/Service Development

Companies are facing highly competitive situations, only constant innovation and development of new products/services could guarantee a competitive advantage. However, as consumerism rises, traditional innovation models are unable to quickly and accurately satisfy the needs of customers. In order to reduce risks and accelerate the speed of new product/service development, customers' involvement has become one of the most important issues concerning new product/service development.

7.6.1 New Product/Service Development

Facing the fierce competition from domestic as well as foreign rivals, companies can only beat their competitors through rapid introducing new products/services which could meet the changing needs of customers. However, developing a new product/service often takes a very long time; in order to reduce risks, scholars start study the new product/service development process to enhance the efficiency and effectiveness of this process.

In the late '80s, as the importance of the manufacturing sector become well recognized, scholars focused on the development of new products. They proposed a stage-gate model to efficiently manage different stages of the new product development process.

As the service industry has played a crucial role in the world economy, academics started to pay more attention on new service development however, most of the new service development models are based on new product development. Apart from incorporating the concept of project management, the overlapped activities during the development process, and the information sharing inside and outside the company, scholars and practitioners have yet not find a easier way to facilitate the process and improve the effectiveness as well as efficiency of new product/service development. However, studies approved that interacting with different kinds of customers and inviting them to participate in the development process might significantly improve the performance of new product/service development.

Customer involvement is defined here as those processes, deeds, and interactions where a product or service provider collaborates with current customers at the program, project, and/or stage level of innovation, to anticipate customer's latent needs and develop new product or service accordingly.

The elements of customer involvement are illustrated in figure 7.3. The two arrows symbolize an on-going, iterative development program where development projects build up the product and service portfolio of a firm. Customer involvement requires making a decision about the following factors:

- What type of customers to involve.
- To what extent they should be involved.
- How it should be done.

The broken line illustrates the organizational context, in which a firm decides on the strategy of the development organization.

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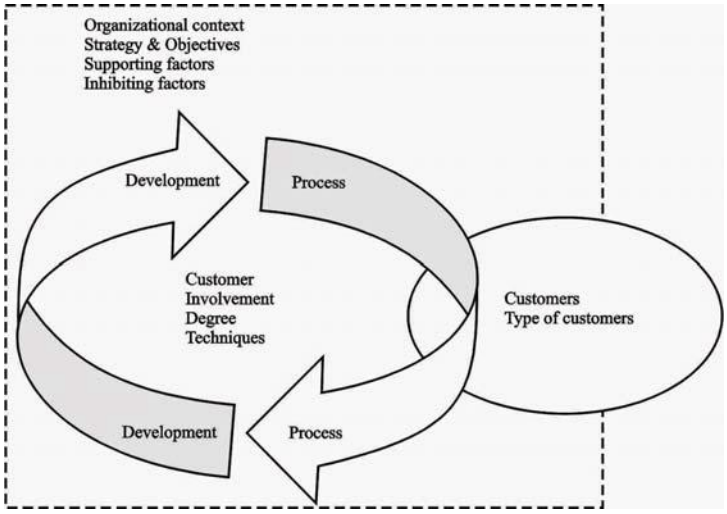
Figure 7.3: Elements of Customer Involvement in Product and Service Development



The motives to involve customers are also important and will determine how customer involvement is carried out and what results can be achieved. Finally, there might be problems associated with customer involvement.

7.6.2 Different Types of Customers

A traditional approach of product and service development is to obtain information from representative customers at the center of the intended target market. Companies often obtain information about customer needs only, and assign manufacturers with the task of generating ideas for solutions leading to new products. Company employees are required to translate needs into solutions that should fir these needs. Lead users present strong needs that will become general in a market place months or years in the future. As there are no products or services available on the market to fulfill their needs, lead users often develop a solution on their own and can therefore provide design data as well. Consequently, the lead user process takes a different approach from that of traditional methods, collecting information about both needs and solutions from the leading edges of the target market and from markets facing similar problems in a more extreme form. In slow-moving industrial markets, "average users" may provide satisfactory input to the development process. The relationship between customer characteristics and new product success in a machine industry context. Four customer characteristics were used including technical attractiveness, financial attractiveness, closeness and relationship with the customer, and lead user characteristics. They found that financially attractive customers, lead users, and close customers has a positive impact on new product success. Technically attractive customer, on the other hand, had a negative impact on new product success. A possible explanation is that they have needs that are different from those of the market in general and therefore can mislead the company.

Some companies choose to primarily work with financially attractive customers, whereas about 30% of the companies do not make any special selection of customers. An overview of the results from the investigated companies is provided in Figure 7.4. For some companies the strategy is to work with the customers who are interested in cooperation or to cooperate with the customers who are available at a specific moment.

When comparing different types of market characteristics, that is B2B or B2C, we found that companies on the business market are more likely than companies on the consumer market to use customers with a special expertise (Chi-square = 23.9, $p<0.01$).

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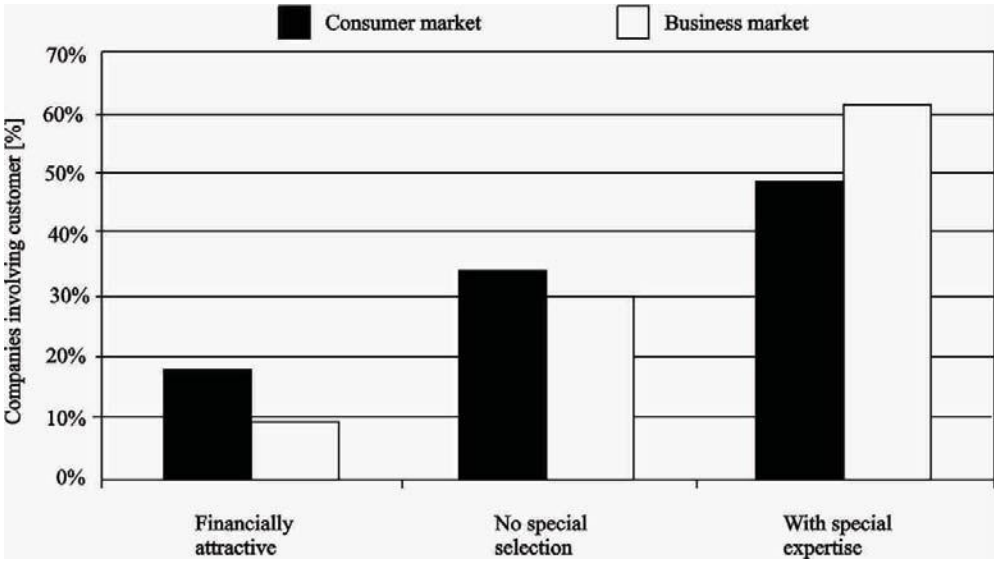
Figure 7.4: An Overview of the Type of Customers that are involved in the Development Process



Self Assessment

Fill in the blanks:

20. Effective ..... marketing depends on the availability of discriminatory information on customers.

21. ..... is defined here as those processes, deeds where a product or service provider collaborates with current customers at the program, project, and/or stage level of innovation, to anticipate customer's latent needs and develop new product or service accordingly.

Case Study

Gold Coast Advertising

George Stein sat in his large office overlooking Chicago's Michigan Avenue. As CEO of Gold Coast Advertising he seemed to always be confronted with one problem or another. Today was no exception. George had just come out of a long meeting with Jim Gerard, head of the Board for the small advertising agency. Jim was concerned about a growing problem with lowered sales expectations and a decreasing customer base. Jim warned George that something had to be done quickly or Jim would have to go to the Board for Action. George acknowledged that sales were down but attributed this to general economic conditions. He assured Jim that the problems would be addressed immediately. As George pondered his next course of action, he admitted to himself that the customer base of GCA was slowly decreasing. The agency did not quite understand the reason for this decrease. Many regular customers were not coming back and the rate of new customers seemed to be slowly declining. GCA's competitors seemed to be doing well. George did not understand the problem.

Contd...

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What Do Customers Want?

GCA was a Chicago-based advertising agency that developed campaigns and promotions for small- and medium-sized firms. Their expertise was in the retail area, but they worked with a wide range of firms from the food service industry to the medical field. GCA competed on price and speed of product development. Advertising in the retail area was competitive and price had always been important. Also, since retail fashions change rapidly, speed in advertising development was thought to be critical. George reminded himself that price and speed had always been what customers wanted. Now he felt confused that he really didn't know his customers. This was just another crisis that would pass, he told himself. But he needed to deal with it immediately.

Questions

1. What is wrong with how Gold Coast Advertising measures its quality? Explain why Gold Coast should ask its customers about how they define quality.
2. Offer suggestions to George Stein on ways of identifying quality dimensions GCA's customers consider important.
3. Develop a short questionnaire to be filled out by GCA's customers that evaluates how customers define quality.

7.7 Summary

- Customer retention is the key to any organization's effectiveness. Customer centric approach to marketing program helps retain customers and win back lost customers.
- Relationship marketing is emerging as the core marketing activity for businesses operating in fiercely competitive environments.
- Customer retention is the activity that a selling organization undertakes in order to reduce customer defections.
- A company's ability to attract and retain new customers, is not only related to its product or services, but strongly related to the way it services its existing customers and the reputation it creates within and across the marketplace.
- Negative customer retention strategies impose high switching costs on customers, discouraging defection.
- It is a fundamental precept of modern customer management that companies should understand customers, then acquire and deploy resources to ensure their satisfaction and retention.
- A number of companies have adopted 'customer delight' as their mission, including Cisco, American Express and Kwik-Fit, the auto service chain.
- Customer retention is not only a cost effective and profitable strategy, but in today's business world it's necessary.
- To achieve the objectives of the database and customer retention programs, the entire campaign should be designed and carried out with the customer in mind.
- Retaining and developing customers has long been a critical success factor for businesses.
- In facing the competitive threats, such as new entrants, pricing pressures, technology along with the related costs and also including the time lags in procuring, maintaining and strengthening one's market, more and more organizations are realizing that the traditional marketing model is no longer effective.

Notes

- TQM is aimed at improving quality and reducing costs. The TQM philosophy has been prevalent in many companies, which find it necessary to involve both suppliers and customers for implementing TQM at all levels of the value chain.
- Building customer loyalty is the basic platform of relationship formation. Customer loyalty is a company's ability to retain satisfied customers.
- A customer loyalty program is based on a simple premise: as a company develops stronger relationships with their best customers, those customers will stay with the company longer and become more profitable.
- Trust exist when one party has confidence that he or she can rely on the other exchange partner. Trust can be defined as the willingness of the customer to rely on the organization or brand to perform its stated function.
- As the service industry has played a crucial role in the world economy, academics started to pay more attention on new service development however, most of the new service development models are based on new product development.
- Customer involvement is defined as those processes, deeds, and interactions where a product or service provider collaborates with current customers at the program, project, and/or stage level of innovation, to anticipate customer's latent needs and develop new product or service accordingly.

7.8 Keywords

***Customer Delight*:** The result of delivering a product or service that exceeds customer expectations is known as customer delight.

Customer Loyalty: A customer's feeling or attitude of attachment to the company is referred to as customer loyalty.

Customer Relationship Management: The processes and systems that combine sales, marketing, contact management and support activities in managing customer interaction is known as CRM.

Customer Retention: The act of keeping your customers and not losing them to competitors, usually by performing a valuable service is known as customer retention.

Exit Penalties: This is the charge applied by a financial institution when you cash in an investment within a set number of years or before a specific maturity date.

Flexible Manufacturing Systems: Flexible manufacturing system is an integrated manufacturing capability to produce small numbers of a great variety of items at low unit costs

Global Account Management: It is relationship-oriented marketing management approach focusing on dealing with the needs of an important global customer with a global organization.

Key Account Management: Account management as applied to a company's most important customers is known as key account management.

Relationship Marketing: Relationship marketing refers to the benefits that ongoing relationships with key customers can bring to an organization.

Sales Force Automation: Software and systems that support sales staff lead generation, contact, scheduling, performance tracking and other functions is referred to as sales force automation.

Standing Orders: Standing order is an order or rule governing the procedures of a society, council, or other deliberative body.

Notes

Supply Chain Management: SCM is managing and controlling the flow of goods through the supply chain.

Total Cost of Ownership: In addition to the initial cost of a purchase, all long-term and indirect costs resulting from that purchase is referred to as total cost of ownership.

Zero Defects: Zero defects is a quality philosophy based on the idea that a level of perfect quality, as in zero defects, is achievable and should be a company-wide goal.

7.9 Review Questions

1. What do you mean by customer retention strategy?
2. Differentiate between positive customer retention strategy and negative customer retention strategy.
3. Explain the concept of customer delight with the help of a diagram and example.
4. Describe the keys of customer retention.
5. What do you understand by customer loyalty? Have you ever been loyal to a particular brand? Give reasons for it.
6. Explain the factors that affect customer loyalty.
7. Write short note on emotional bonding.
8. Explain the elements of customer involvement in product/service development with the help of an example.
9. What are the benefits of customer involvement in product/service development?
10. Write a short note on:
    (a) Systems selling approach
    (b) Global Account Management Programs
    (c) Choice Reduction and Habit
    (d) Typical Elements of a Strategy
    (e) Proactive Leadership

Answers: Self Assessment

1. Retention
2. Relationship
3. Defections
4. Negative
5. Total Cost of Ownership
6. Expectations
7. Database marketing programs
8. Acquisition
9. Manpower

Notes

10. Account information
11. Systems selling
12. CRM
13. Loyalty
14. Effective marketers
15. Brand equity
16. Trust
17. Perceived risk
18. Customer strategy
19. Segment
20. Target
21. Customer involvement

7.10 Further Readings

Books

Besterfield Dale H. (2011). *Total Quality Management*. Pearson Education.

Charantimath M. Poornima (2009). *Total Quality Management*. Pearson Education.

Mukherjee N. P. (2006). *Total Quality Management.* PHI Learning Pvt. Ltd.

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Online links

http://www.scribd.com/doc/91797946/Total-Quality-Management

http://www.pulseplm.com/wp-content/pdf/crm4pp.pdf

http://totalqualitymanagement.wordpress.com/tag/customer-retention/

http://prr.hec.gov.pk/Chapters/276S-2.pdf

Notes

Unit 8: Employee Involvement

CONTENTS

Objectives
Introduction
8.1 Motivation
8.1.1 Maslow's Hierarchy of Needs
8.1.2 Herzberg's Two-Factor Theory
8.2 Employee Surveys
8.3 Employee Empowerment
8.4 Teams
8.4.1 Why Team Work
8.4.2 Types of Teams
8.4.3 Characteristics of Successful Teams
8.4.4 Decision-Making Method
8.4.5 Stages of Team Development
8.4.6 Common Barriers to Team Progress
8.5 Suggestion System
8.6 Performance Appraisal
8.6.1 Importance of Performance Appraisals
8.7 Summary
8.8 Keywords
8.9 Review Questions
8.10 Further Readings

Objectives

After studying this unit, you will be able to:

- Define motivation
- Discuss the two theories of motivation
- Explain Herzberg's two-factor theory
- Elaborate on employee surveys
- Explain employee empowerment and suggestion system

Introduction

In previous unit, we dealt with the importance of customer satisfaction, their perception of quality and service quality. We also discussed on customer feedback methods and customer retention.

This unit will help you to understand employee involvement and their empowerment the various sections and sub-sections will also summarize the suggestion system and performance appraisal methods.

Notes

Employee involvement is one approach to improving quality and productivity. Its use is credited for contributing to the success enjoyed by the Japanese in the world marketplace. Employee involvement is not a replacement for management nor is it the final word in quality improvement. It is a means to better meet the organization's goals for quality and productivity at all levels of an organization.

8.1 Motivation

Knowledge of motivation helps us to understand the utilization of employee involvement to achieve process improvement.

8.1.1 Maslow's Hierarchy of Needs

One of the first popular motivational theories was developed by Abraham Maslow. He stated that motivation could best be explained in terms of a hierarchy of needs and that there were five levels. These levels are survival, security, social, esteem, and self-actualization. Once a given level is satisfied, it can no longer motivate a person.

Relating these needs to motivation, we know that Level 1 (survival) means food, clothing, and shelter, which is usually provided by a job. In the workplace, Level 1 needs include proper lighting, heating/air conditioning, ventilation, phone system, data/voice access, and computer information system. Level 2 (security) can mean a safe place to work and job security, which are very important to employees.

Self actualization
Esteem
Social
Security
Survival

When the organization demonstrates an interest in the personal well-being of employees, it is a motivating factor. A threat of losing one's job certainly does not enhance motivation. Level 2 is not limited to job security. It also includes having privacy on the job such as being able to lock one's office door or having lockable storage for personal items, as well as having a safe work environment that may include ergonomic adjustable furniture.

Did u know? Maslow's theory has been elaborated by some researchers and an 8-step hierarchy of needs pyramid has been developed. These 8 needs are: (1) physiological needs, (2) Safety needs, (3) social needs, (4) Esteem needs, (5) Cognitive needs, (6) Aesthetic needs, (7) Self-actualization needs, (8) Transcendence needs.

Level 3 (social) relates to our need to belong. It has been said that cutting someone out of the group is devastating to that individual. Isolation is an effective punishment. Conversely, giving an individual the opportunity to be part of the group by feeling important and needed will motivate that person. If possible, employees should be provided with both formal social areas such as a cafeteria and conference rooms and informal areas such as water coolers and bulletin boards. Being a member of a team is a good way to bring employees into the group. Level 4 (esteem) relates to pride and self worth. Everyone, regardless of position or job assignment, wants to be recognized as a person of value to the organization. Where possible, employees

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should be given offices or personal spaces with aesthetics. Business cards, workspace size, and office protocols also provide employees with a certain level of self-esteem within an organization. Seeking advice or input into business or production processes is a good way of telling employees that they are of value. This activity requires giving employees control and freedom of their jobs by providing trust. Level 5 (self-actualization) says that individuals must be given the opportunity to go as far as their abilities will take them. Many organizations have a policy of promoting from within. It is that some employees do not want to move up the corporate ladder, which is understandable. However, those who do want to move up know that it is possible.

It is important to note that as employees move up the hierarchy, they will immediately revert back to the previous level if they feel threatened.

Example: If an employee is satisfied in Level 3, a rumor of downsizing may cause an immediate return to Level 2.

8.1.2 Herzberg's Two-Factor Theory

Frederick Herzberg extended the general work of Maslow by using empirical research to develop his theory on employee motivation. He found that people were motivated by recognition, responsibility, achievement, advancement, and the work itself. These factors were labeled motivators. In addition, his research showed that bad feelings were associated with low salary, minimal fringe benefits, poor working conditions, ill-defined organizational policies, and mediocre technical supervision. These job-related factors were labeled dissatisfies or hygiene factors, which implies they are preventable. It is important to realize that dissatisfiers are often extrinsic in nature and motivators are intrinsic.

Caution Dissatisfiers must be taken care of before motivators can be actuated.

The presence of the extrinsic conditions does not necessarily motivate employees; however, their absence results in dissatisfaction among employees. Absence of motivating factors does not make employees dissatisfied, but when there are motivating factors present, they do provide strong levels of motivation that result in good job performance for the individual and the organization.

Notes Herzberg's dissatisfiers are roughly equivalent to Maslow's lower levels, and the motivators are similar to the upper levels.

Employee Wants

While management thinks that good pay is the number one want of the employee, survey results show that this factor is usually in the middle of the ranking. Employee wants tend to follow the theories of Maslow and Herzberg. It is interesting to note that the manager's perceptions are much different. By involving employees through the use of teams in meaningful work and by providing the proper reward and recognition, manager can reap the advantages of greater quality and productivity along with employee satisfaction. If managers are to effectively motivate employees, they must align their actions closer to the motivators. The important parameters are interesting work, appreciation, involvement, job security, good pay, promotion/growth, good working conditions, loyalty to employees, help with personal problems and tactful discipline.

Achieving a Motivated Work Force

Notes

Concepts to achieve a motivated work force are as follows:

1. Know thyself
2. Know your employees
3. Establish a positive attitude
4. Share the goals
5. Monitor progress
6. Develop interesting work
7. Communicate effectively
8. Celebrate success

These eight concepts can be used at all managerial levels of the organization.

Self Assessment

Fill in the blanks:

1. Employee …….. is an approach to improving quality and productivity.
2. ……. states that motivation could best be explained in terms of a hierarchy of needs and that there were five levels.
3. …….. says that individuals must be given the opportunity to go as far as their abilities will take them.
4. …….. wants tend to follow the theories of Maslow and Herzberg.

8.2 Employee Surveys

Employee survey teams are created by the quality council. These surveys help the managers assess the current state of employee relations, identify trends, measure the effectiveness of program implementation, identify needed improvements, and increased communication effectiveness.

STEP 1: The Quality Council to create a multifunctional team.

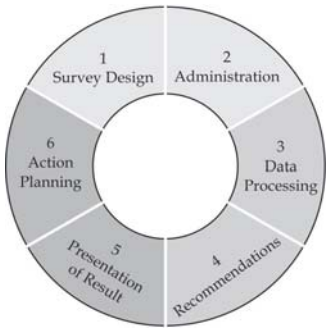
STEP 2: The Team will develop survey instrument. The concepts to be used in formulating the instruments are: personality characteristics, management styles, job attitudes, the work.

STEP 3: Administer the survey (is confidential and by 3rd party).

STEP 4: Results are compiled and analyzed (report is circulated in the firm).

STEP 5: Determine areas for improvement.

Figure 8.1: Employee Survey Process



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8.3 Employee Empowerment

The Manufactures Alliance for Productivity and Innovation stated that "Organizations that empower employees as part of their total management effort are twice as likely as other firms to report significant product or service improvement."

The dictionary definition of empowerment is to invest people with authority; its purpose is to tap the enormous reservoir of potential contribution that lies within every worker.

An operational definition follows:

Empowerment is an environment in which people have the ability, the confidence, and the commitment to take the responsibility and ownership to improve the process and initiate the necessary steps to satisfy customer requirements within well-defined boundaries in order to achieve organizational values and goals.

Empowerment should not be confused with delegation or job enrichment. Delegation refers to distributing and entrusting work to others. Employment requires that the individual is held responsible for accomplishing a whole task. The employee becomes the process owner–thus, the individual is not only responsible but also accountable, and job enrichment aims at expanding the content of an individual's job, whereas empowerment focuses on expanding on the contest of the job such as its interactions and interdependencies to other functions of the organization.

In order to create the empowered environment, three conditions are necessary:

1. Everyone must understand the need for change.
2. The system needs to change to reinforce and motivate individual and group accomplishments.
3. The organization must enable its employees by providing information, education and skill.

8.4 Teams

Employee involvement is optimized by the use of teams. However, are not a panacea for solving all quality and productivity problems, but in most instances, they are effective.

A team is defined as a group of people working together to achieve common objectives or goals. Teamwork is the cumulative actions of the team during which each member of the team subordinates his individual interests and opinions to fulfill the objectives or goals of the group, the objective or goal is a need to accomplish something such as solve a problem, improve a process, design a refrigerator, plan a conference, audit a process, or please a customer, it needs to be clearly defined, have milestones set, have resources provided, and use a systematic approach, members of the team will need to focus on how they relate to each other, listen to the suggestions of others, build on previous information, and use conflict creatively, they will need to set standards, maintain discipline, build team spirit, and motivate each other. Each member of the team has their own history of experience to help achieve the objective. They should have a need to see the task completed, but also the needs of companionship, fulfillment of personal growth, and self-respect.

8.4.1 Why Team Work

Teams work because many heads are more knowledgeable than one, each member of the team has special abilities that can be used to solve problems, and many processes are so complex that one person cannot be knowledgeable concerning the entire process; second, the whole is greater

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than the sum of its members. The interaction within the team produces results that exceed the contributions of each member, third, team members develop a rapport with each other that allows them to do a better job, finally, teams provide the vehicle for improved communication, thereby increasing the likelihood of a successful solution.

8.4.2 Types of Teams

Quality Circles: The early history suggests that work simplification efforts by management and labor were most likely the first production-oriented teams. However, the development of quality control circles by the Japanese in 1961 is considered to be the beginning of the use of teams to improve quality; quality control circles are groups of people from one work unit who voluntarily meet together on a regular basis to identify, analyze, and focus on quality-of-work-life and health/safety issues rather than on improving work processes. Often they remain in existence over a long period of time, working on project after project. Quality control circles have been quite successful in Japan and enjoyed some initial success in other countries but not as extensive. A major drawback was a lack of middle management support, without managers on teams or directly overseeing the teams as a quality council might, members frequently were not able to persuade management to implement their recommendations.

Outside Japan, the popularity of quality control circles has declined but for few industries. However, this type or team is the progenitor of our present teams, the current types of teams can be divided into four main groups. They may be called by different names and have slightly different characteristics to accommodate a particular organization.

1. ***Process Improvement Team:*** The members of process improvement team represent each operation of the process or sub-process, usually the scope of the team's activity is limited to the work unit, a team of about six to ten members will come from the work unit and, depending on the location of the sub-process, an external or internal supplier and external or internal customer would be included on the team. During the course of the team's life, additional expertise from other work areas may be added on a permanent or temporary as-needed basis. The life cycle of this type of team is usually temporary–it is disbanded when the objective has been obtained. When the targeted process includes many work units or the entire organization, a cross-functional team may be more appropriate with work unit teams as sub-teams.

2. ***Cross-functional Team:*** A team of about six to ten members will represent a number of different functional areas such as engineering, marketing, accounting, production, quality, and human resources. It may also include the customer and supplier, a design review team is a good example of a cross-functional team. This type of team is usually temporary. An exception would be a product support team, which would be permanent and have as an objective to serve a particular product line, service activity, or a particular customer, this type of team breaks down functional area boundaries.

3. ***Natural work Teams***: This type of team is not voluntary – it is composed of all the members of the work unit, it differs from quality control circles because a manager is part of the team and the projects to be improved are selected by management, some employees may opt not to work in teams for a variety of reasons, and managers should anticipate this action and be prepared to help employees become comfortable in the team environment or, alternatively, find work in another unit that still performs work as individuals, even though "team work" is technically feasible, there may be such resistance that its introduction should be delayed until there has been substantial turnover,

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4. ***Self-directed/self-managed Work Teams:*** They are an extension of natural work teams without the supervisor, thus, they are the epitome of the empowered organization–they not only do the work but also manage it, there is wide discretion to organize their work subject organizational work flow requirements. There is a team coordinator to liaison with senior management that may rotate among members. The team meets daily to plan their activities, and decisions are usually by consensus, additional responsibilities may include; hiring/dismissal, performance evaluation, customer relations supplier relations, recognition/reward, and training, the team must have access to business information in order to plan, control, and improve their processes.

8.4.3 Characteristics of Successful Teams

In order for a team to be effective, it should have certain characteristics, listed below:

- ***Sponsor:*** To have effective liaison with the quality council, preferably the sponsor is a member of the quality council providing organizational support.
- ***Team Charter:*** A team charter is a document that defines the team's mission, boundaries, the background of the problem, the team's authority and duties, and resources.
- ***Team Composition:*** The size of the team should rarely exceed ten people except in the case of natural work teams or self-directed teams.
- ***Training:*** As the need arises, members should be trained in problem-solving techniques, team dynamics, and communication skills.
- ***Ground Rules:*** The team must develop its rules of operation.
- ***Clear Objectives:*** The criteria for success should be agreed on with management.
- ***Accountability:*** The team is accountable to perform. Periodic status reports should be given to the quality council.
- ***Well-defined Decision Procedures:*** Effective, acceptable, and timely decisions have to be made by the team.
- ***Resources:*** Not only is funding and employee release time for the project important, but also important is access to information, the team cannot be expected to perform successfully without necessary tools.
- ***Trust:*** Management must trust the team to perform the task effectively. There must also be trust among the members and a belief in each other.
- ***Effective Problem Solving:*** Decisions are based on the problem-solving methods discussed later.
- ***Open Communication:*** Members actively listen, without interruption, to other members, speak with clarity and directness, ask questions, and say what they mean.
- ***Appropriate Leadership:*** All teams need leadership–whether imposed by the quality council, or whether someone emerges as a leader figure as the life of the team progresses.
- ***Balanced Participation:*** All members must become involved in the team's activities by voicing their opinions, lending their knowledge, and encouraging other members to take part.
- ***Cohesiveness:*** Members should be comfortable working with each other and act as a single unit, not as individuals or sub-groups.

Notes

8.4.4 Decision-Making Method

Since the decision-making process is critical to the success of the team, it is essential to understand the different methods. Five types of decisions, as well as no decision, occur during the team process.

1. Non-decision
2. Unilateral decision
3. Handclasp decision. When one person proposes a decision and another agrees, we have the handclasp decision
4. Minority-rule decision
5. Majority-rule decision
6. Consensus.

Ultimately, it is up to the team leader to select the appropriate method, if the leader has the trust of the team and the team understands the circumstances, whatever method is selected will be accepted.

8.4.5 Stages of Team Development

Organizations can dramatically improve team performance by understanding and recognizing the stages in the life cycle of teams. Bruce Tuckerman found that there were four staged to a team's development. These staged are forming, storming, norming and performing.

1. Forming is the beginning stage where members become aware of the boundaries of acceptable behaviour.
2. Storming is the most difficult stage as members start to realize the amount of work that lies ahead. There is a tendency to panic. A position shows strength.
3. Norming is the stage where members begin to work together. Emotional conflict is reduced as cooperation, cohesion, and constructive criticism start to become the normal behavior.
4. Performing is the stage where the team members have settled their relations and expectations. They better understand the project and begin performing by diagnosing and solving problems and choosing and implementing changed. Members understand their roles and work in concert to achieve their objective(s) effectively and efficiently.
5. Adjourning is a stage that is reserved for temporary teams. The team needs to evaluate its performance and determine lessons learned. This information can be transferred by members when they participate on future teams. There also needs to be a celebration to recognize the team's contribution to the organization.

8.4.6 Common Barriers to Team Progress

- Insufficient training.
- Incompatible rewards and compensation.
- First-line supervisor resistance.
- Lack of planning.
- Lack of management support.
- Access to information systems.

Notes

- Lack of union support.
- Project scope too large.
- Project objectives are not significant.
- No clear measures of success.
- No time to do improvement work.
- Team is too large.
- Trapped in group thinking.

Task Has your class ever been divided into groups? What kind of group was it? Explain the four stages of team development in context of your team. Present an article on it.

Self Assessment

Fill in the blanks:

5. Employee survey teams are created by the……..... .
6. Empowerment should not be confused with or job enrichment.
7. …….. focuses on expanding on the contest of the job such as its interactions and interdependencies to other functions of the organization.
8. Each member of the team has their own history of …….. to help achieve the objective.
9. The life cycle of …….. type of team is usually temporary-it is disbanded when the objective has been obtained.
10. …… is an extension of natural work teams without the supervisor.
11. ……. is a stage that is reserved for temporary teams.

8.5 Suggestion System

Suggestion systems are designed to provide the individual with the opportunity to be involved by contributing to the organization. Most of the ideas for continuous improvement will come from the team approach. However, once the foundation for a TQM organization has been established, a suggestion system can operate effectively and in parallel to the team approach. The key to an effective system is management commitment. Management must make it easy for employees to suggest improvements. Management should then review them promptly and if feasible, implement them.

Stimulating and encouraging employee participation starts the creative process. There are five ground rules:

1. Be progressive by regularly asking your employees for suggestions.
2. Remove fear by focusing on the process and not on the person.
3. Simplify the process so it is easy to participate. Stamp out superfluous paperwork, review, and procedures.
4. Respond quickly to suggestions and within a specific period of time.

Notes

5. Reward the idea with published recognition so that everyone knows the value of the contribution.

Caselet

Employee Involvement: A Vital Aspect of Total Quality Management

The importance of employee involvement in the success of any business

The shrinking global market has led to stiff competition in the business and industrial arena. The entry of a number of new companies, both local and global into various markets has given the customer a wide array of product choices. Many of these new companies are able to produce the same or similar products at almost the same or lower costs. Thus customers today have a wide range of products to choose from. These products not only meet their specifications closely, but also their budgets. Competition has extended far beyond the manufacturing or private sector. Today, the service, government and non-profit sectors also face stiff competition.

The need to grow and succeed in an increasingly competitive market has seen the implementation of various quality initiatives in different organisations. Problem-solving and process improvements are two vital aspects of the quality initiatives, and proactive actions are being taken to prevent problems. Total Quality Management (TQM) is a continuous process that strives to increase customer satisfaction, lower costs, and minimise defects and variations in every aspect and every process of the business.

TQM involves a number of catchwords like Just-In-Time, quality circles, employee involvement, continuous process improvement, empowerment, Kaizen, self-directed work groups and world-class quality. Basically, the philosophy of TQM is to involve every employee in the organisation along with its suppliers and distributors to improve product quality and enhance customer satisfaction.

One of the important concepts of TQM is employee involvement. This is a relatively new method, which is a contrast to conventional management practices, wherein management takes all decisions and workers just follow them to accomplish their jobs. This top-down management style is slow and inflexible with little room for competition. Survival in today's time-starved, customer driven market requires rapid response times from manufacturers and other businesses to the ever-changing customer needs.

This article focuses on the importance of employee involvement in any TQM initiative. Employee involvement is a system wherein employees are encouraged to use their expertise and knowledge to suggest methods for improvements in their work areas. These suggestions could pertain to improvements in the job, the product, the work atmosphere or the company as a whole. Many companies have ventured into a participative style of management by involving employees in the problem solving and decision making processes.

When Ford faced continuous threat of competition from Japanese car manufacturers, it ventured to study how the Japanese were excelling in their performance efficiency. It established a task force to study the Japanese manufacturing process.

Results showed that the key to Japanese performance and efficiency was their empowered workforce and the teamwork involved. Employees were given the responsibility and authority to stop a process if the quality failed to meet the standards specified.

Contd...

Notes

Some of the most successful companies are those that have achieved a close relationship between workers and the managers. The policies in these companies fostered teamwork, participation, continuous learning and flexibility. However, the change from conventional management practices to the new style was not achieved overnight. Learning and implementing participative management requires a lot of effort and time. Implementation of employee involvement systems require many changes in the existing company practices.

The five obstacles that arise when companies try to shift from a traditional management style to a participative one are listed below:

- Resistance to change
- Mistrust of the management's motives by the workers
- Lack of clear expectations from the workers
- Lack of participative skills among employees
- Lack of executive commitment

While change of any kind is difficult for the workers, when suddenly asked for inputs, they tend to doubt the motives of the management. Similarly, they are unsure of the extent of inputs required and the importance placed by the management on these inputs. Poor experience in participative activities is also a hindrance. Above all, it is vital for the management to remain continuously committed to the cause of TQM and employee involvement.

Self Assessment

Fill in the blanks:

12. ..... are designed to provide the individual with the opportunity to be involved by contributing to the organization.
13. The key to an effective suggestion system is..... .

8.6 Performance Appraisal

The purpose of performance appraisals is to let employees know how they are doing, and provide a basis for promotions, salary increases, counseling, and other purposes related to an employee's future. There should a good relationship between the employee and the appraiser. Employees should be made aware of the appraisal process, what is evaluated, and how often. Employees should be told how they are doing on a continuous basis, not just at appraisal time. The appraisal should point out strengths and weaknesses as well as how performance can be improved.

8.6.1 Importance of Performance Appraisals

1. It is necessary to prevail a good relationship between the employee and the appraiser.
2. Employee should be informed about how they are performing on a continuous basis, not just at appraisal time.
3. The appraisal should highlight strength and weakness and how to improve the performance.
4. Employee should be allowed to comment on the evaluation and protest if necessary.
5. Everyone should understand that the purpose of performance appraisal is to have employee involvement. Errors in performance evaluations should be avoided.
6. Unfair and biased evaluation will render poor rating and hence should be eliminated.

Self Assessment

Notes

Fill in the blanks:

14. Stimulating and encouraging employee participation starts the ……. process.

15. There should a ……between the employee and the appraiser.

Case Study

Heavy Truck (HT) Corporation

HT Corporation, a manufacturer of heavy trucks had a long, sad and bitter history of employee relations. The company openly practiced "management through terrorism". Engineers and technicians dominated the culture. One of the company's assembly plants devoted major resources to statistical process control. An entire department staffed with engineers justified its existence by keeping control charts. The engineers collected and stored data on a computer and posted the charts in every production department once each week. They also posted lists of problems and defects attributable to each department. Another department kept itself busy with "work design" and assembly line balancing. The plant was highly product focused. Material moved smoothly from one operation to next.

Subassemblies flowed into the assemblies like tributaries of a river, all moving toward the assembly line.

Despite this effort, quality was mediocre at best. HT Corporation devoted more factory space for rework and repair operations than to the original assembly. The individual and social aspects of the system were largely ignored. People lacked interpersonal skills, common goals and trust, and they could not hope to attain qualities under the existing power structure and reward system.

Questions

1. Comment on the human resources management of the HT Corporation.
2. Why quality was mediocre at best?
3. In spite of problems, the production was smooth. Comment.
4. If you take over as the chief executive officer of HT Corporation what changes would you make? How would you begin?

Source: Visveswaraya Technological University-MBA Question Paper, Total Quality Management, July 2007.

8.7 Summary

- Employee involvement is not a replacement for management nor is it the final word in quality improvement. It is a means to better meet the organization's goals for quality and productivity at all levels of an organization.
- Maslow's Hierarchy of Needs states that there were five levels. These levels are survival, security, social, esteem, and self-actualization. Once a given level is satisfied, it can no longer motivate a person.
- Frederick Herzberg extended the general work of Maslow by using empirical research to develop his theory on employee motivation.

Notes

- The presence of the extrinsic conditions does not necessarily motivate employees; however, their absence results in dissatisfaction among employees.
- If managers are to effectively motivate employees, they must align their actions closer to the motivators.
- Employee surveys help the managers assess the current state of employee relations, identify trends, measure the effectiveness of program implementation, identify needed improvements, and increased communication effectiveness.
- Empowerment is an environment in which people have the ability, the confidence, and the commitment to take the responsibility and ownership to improve the process and initiate the necessary steps to satisfy customer requirements within well-defined boundaries in order to achieve organizational values and goals.
- A team is defined as a group of people working together to achieve common objectives or goals.
- The members of process improvement team represent each operation of the process or sub-process, usually the scope of the team's activity is limited to the work unit, a team of about six to ten members will come from the work unit and, depending on the location of the sub-process, an external or internal supplier and external or internal customer would be included on the team.
- Cross-functional team is a team of about six to ten members will represent a number of different functional areas such as engineering, marketing, accounting, production, quality, and human resources.
- According to Bruce Tuckerman, there are four stages to a team's development. These stages are forming, storming, norming, and performing.
- Suggestion systems are designed to provide the individual with the opportunity to be involved by contributing to the organization.
- The purpose of performance appraisals is to let employees know how they are doing, and provide a basis for promotions, salary increases, counseling, and other purposes related to an employee's future.

8.8 Keywords

Delegation: Delegation is the assignment of authority and responsibility to another person to carry out specific activities.

Employee Empowerment: Giving employees the permission and ability to make decisions and act autonomously for the good of the company.

Employee Involvement: Giving employees input and allowing them an impact on decisions affecting their jobs.

Employee Surveys: A method of collecting data from employees. The reliability of a survey's results depends on whether the sample of people from which the information has been collected is free from bias and sufficiently large.

Herzberg's Two-Factor Theory: Motivation theory which argues that the factors which cause satisfaction on the job are different than those which cause dissatisfaction.

Job Enrichment: An increase in the number of tasks that an employee performs and an increase in the control over those tasks. It is associated with the design of jobs and is an extension of job enlargement.

Notes

Maslow's Hierarchy of Needs: This theory is based on the assumption that there is a hierarchy of five needs within each individual. The urgency of these needs varies.

Motivation: The general desire or willingness of someone to do something.

Performance Appraisal: The process of setting performance expectations and standards for employees and evaluating (and periodically summarizing) performance against those standards to determine whether performance is unacceptable, fully successful, etc.

Self-actualization: The realization or fulfillment of one's talents and potentialities especially considered as a drive or need present in everyone.

Suggestion System: A formal method of obtaining employees' advice for improvement in organizational effectiveness; it includes some kind of reward based on the successful application of the idea.

Team Charter: A team charter is a document that is developed in a group setting that clarifies team direction while establishing boundaries.

8.9 Review Questions

1. What do you understand by motivation? Explain the two theories of motivation.
2. Elaborate the process of employee surveys.
3. Explain employee empowerment.
4. How do you think does the team help in employee empowerment?
5. How many different types of teams are there? Explain them.
6. What are the stages of a team development? Briefly explain.
7. What are the common barriers to team development?
8. Briefly discuss suggestion system.
9. Explain performance appraisal and its importance.
10. Write a short note on:
    (a) Maslow's Hierarchy of Needs
    (b) Herzberg's Two-Factor Theory
    (c) Characteristics of Successful Teams
    (d) Decision making method

Answers: Self Assessment

1. Involvement
2. Maslow's Hierarchy of Needs
3. Self-actualization
4. Employee
5. Quality council
6. Delegation
7. Empowerment

Notes

8. Experience
9. Process improvement
10. Self-directed teams
11. Adjourning
12. Suggestion systems
13. Management commitment
14. Creative
15. Good relationship

8.10 Further Readings

Books

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Notes

Unit 9: Process Improvement

CONTENTS

Objectives
Introduction
9.1 Continuous Process Improvement
9.2 The Juran Trilogy
9.3 The PDCA cycle
9.4 Kaizen
9.5 Six Sigma Methodology
9.5.1 DMAIC
9.6 WV Model of Continuous Improvement
9.7 Summary
9.8 Keywords
9.9 Review Questions
9.10 Further Readings

Objectives

After studying this unit, you will be able to:

- Define continuous process improvement
- Explain Juran Trilogy
- Explain PDSA cycle
- Elaborate Kaizen and Six Sigma Methodology
- Discuss DMAIC and WV Model of Continuous Improvement

Introduction

Previous unit gave you an insight on the employee involvement, various employee surveys carried out and their empowerment. It also talked about the suggestion system and the performance appraisal. In this unit you will study about the concept of continuous process improvement.

Continuous improvement is a very important component of Total Quality Management. As every product or service is the outcome of a process, the effective way to improve quality is to improve the process used to build the product. The corollary of focusing on process is that the focus is not on the results – results are the dependent variable. The results come from whatever process is followed – process drives results. TQM calls this focus on process 'management by process'. It consists of realizing that results come from process, building a process to produce the desired results, implementing the process so one can later figure out why it produced the results it did, and then feeding this insight back to improve the process next time it is used.

9.1 Continuous Process Improvement

Organizations should strive to achieve perfection by continuously improving the business and production processes. The goal is to achieve perfection and must continually strive for its attainment.

Notes

Improvement is made by:

- Viewing all works as a process, whether it is associated with production or business activities.
- Making all process effective, efficient, and adaptable.
- Anticipating changing customer needs.
- Controlling in-process performance using measures such as scrap reduction, cycle time, control charts, and so forth.
- Maintaining constructive dissatisfaction with the present level of performance.
- Eliminating waste and rework wherever it occurs.
- Investigating activities that do not add value to the product or service, with the aim of eliminating those activities.
- Eliminating non-conformities in all phases of everyone's work, even if the increment of improvement is small.
- Using benchmarking to improve competitive advantage.
- Innovating to achieve breakthroughs.
- Incorporating lessons learned into future activities.
- Using technical tools such as Statistical Process Control (SPC), experimental design, benchmarking, Quality Function Deployment (QFD), and so forth.

Process

Process refers to business and production activities of an organization. Business processes such as purchasing, engineering, accounting, and marketing are areas where non-conformance can present an opportunity for substantial improvement.

There are five basic ways to improve:

1. Reduce resources
2. Reduce errors
3. Meet or exceed expectations of downstream customers
4. Make the process safer
5. Make the process more satisfying to the person doing it

Self Assessment

Fill in the blanks:

1. …… is a very important component of Total Quality Management.
2. …….. refers to business and production activities of an organization.

9.2 The Juran Trilogy

Process improvement involves planning. One of the best approaches is the one developed by Dr. Joseph Juran. It has three components: planning, control, and improvement, and is referred to as the Juran Trilogy. It is based on financial processes such as budgeting (planning), expense measurement (control), and cost reduction (improvement).

Notes

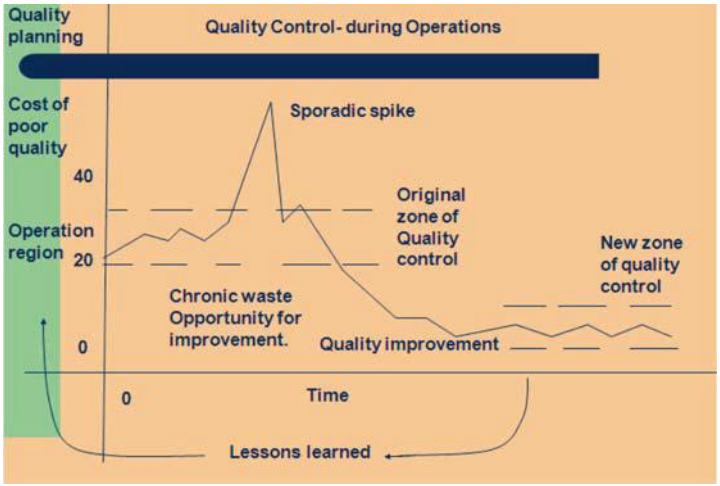
***Planning*:** The planning component begins with external customers. Once quality goals are established, marketing determines the external customers, and all organizational personnel (managers, members of multifunctional teams, or work groups) determine the customers. External customers may be quite numerous, as is the case of a bank supply organization, where they include tellers, financial planners, loan officers, auditors, managers, and the bank's customers.

***Control*:** Control is used by operating forces to help meet the product, process, and service requirements. It uses the feedback loop and consists of the following steps:

1. Determine items/subjects to be controlled and their units of measure.
2. Set goals for the controls and determine what sensors need to be put in place to make the product, process, or service.
3. Measure actual performance.
4. Compare actual performance to goals.
5. Act on the difference.

***Improvement*:** The third part of the trilogy aims to attain levels of performance that are significantly higher than current levels. Process improvements begin with the establishment of an effective infrastructure such as quality council.

Figure 9.1: The Juran Trilogy Diagram



Self Assessment

Fill in the blanks:

3. Process improvement involves…….. .
4. The planning component begins with …… customers.

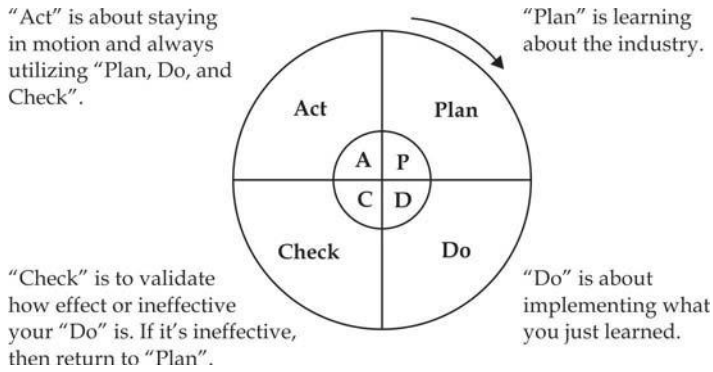
9.3 The PDCA Cycle

The PDCA (or PDSA) Cycle was originally conceived by Walter Shewhart in 1930s, and later adopted by W. Edwards Deming. The model provides a framework for the improvement of a process or system. It can be used to guide the entire improvement project, or to develop specific projects once target improvement areas have been identified.

Notes

The PDCA cycle is designed to be used as a dynamic model. The completion of one turn of the cycle flows into the beginning of the next. Following in the spirit of continuous quality improvement, the process can always be reanalyzed and a new test of change can begin. This continual cycle of change is represented in the ramp of improvement.

Figure 9.2: The PDCA Cycle or Deming's Wheel



Plan: A change or a test, aimed at improvement. In this phase, analyze what you intend to improve, looking for areas that hold opportunities for change. The first step is to choose areas that offer the most return for the effort you put in. To identify these areas for change consider using a Flow chart or Pareto chart.

Do: Carry out the change or test (preferably on a small scale). Implement the change you decided on in the plan phase.

Check or Study: The results. What was learned? What went wrong? This is a crucial step in the PDCA cycle.

You must decide on several measures with which you can monitor the level of improvement. Run Charts can be helpful with this measurement.

Act: Adopt the change, abandon it, or run through the cycle again. After planning a change, implementing and then monitoring it, you must decide whether it is worth continuing that particular change. If it consumed too much of your time, was difficult to adhere to, or even led to no improvement, you may consider aborting the change and planning a new one. However, if the change led to a desirable improvement or outcome, you may consider expanding the trial to a different area, or slightly increasing your complexity. This sends you back into the Plan phase and can be the beginning of the ramp of improvement.

Problem Solving Method

1. ***Identify the opportunity***
   - (a) Identify the Problem.
   - (b) Pareto analysis of external alarm signals.
   - (c) Pareto analysis of internal alarm signals.
   - (d) Proposals from key insiders.
   - (e) Proposals from suggestion schemes.
   - (f) Field study of user's needs.
   - (g) Comments of key people outside the organization.

Notes

(h) Customer surveys.

(i) Employee surveys.

(j) Brainstorming by work groups.

(k) Form the Team.

(l) Team should be selected.

(m) Define the Scope.

Criteria for a good problem statement are as follows:

(a) It clearly describes the problem.

(b) It states the effect.

(c) It focuses on what is known, unknown etc.

(d) It emphasizes the impact on the customer.

2. ***Analyze the current process:***

The objective is to understand the process and how it is currently performed.

Step 1: The team to develop a process flow diagram.

Step 2: The target performance measures are defined.

Step 3: Collection of all available data and information.

Common items of data and information are

(a) Customer information

(b) Design information

(c) Process information

(d) Statistical information

(e) Quality information

(f) Supplier information

3. ***Develop the optimal solution(s)***

This phase has the objective of establishing potential and feasible solutions and recommending the best solution to improve the process.

Creativity plays the major role, and brainstorming is the principal technique.

There are three types of creativity:

- Create new processes
- Combine different processes
- Modify the existing process

4. ***Implement changes:***

This phase has the objective of preparing the implementation plan, obtaining approval and implementing the process improvements.

- Approval of the quality council.
- Obtain the advice and consent of departments, functional areas, teams, individuals etc.
- Monitor the activity.

Notes

5. ***Study the results:***

   This phase has the objective of monitoring and evaluating the change by tracking and studying the effectiveness of the improvement efforts.

6. ***Standardize the solution:***

   - Institutionalize by positive control of the process.
   - The quality peripherals – the system, environment and supervision must be certified.
   - Operators must be certified.

7. ***Plan for the future:***

   The objective is to achieve improved level of process performance.

   - Regularly conduct reviews of progress by the quality council.
   - Establish the systems to identify area for future improvements.
   - Track performance with respective internal & external customers.
   - TQM tools and techniques are used to improve quality, delivery and cost.

Task Present a descriptive article on PDCA cycle and Juran trilogy with special emphasis on how are the two similar and in which aspects are they different.

Self Assessment

Fill in the blanks:

5. The PDCA Cycle was originally conceived by ..... .
6. The objective of plan for the future is to achieve improved level of ..... performance.
7. …….. phase has the objective of monitoring and evaluating the change by tracking and studying the effectiveness of the improvement efforts.
8. Creativity plays the major role, and ……is the principal technique.

9.4 Kaizen

Kaizen means continuous improvement in personal life, social life and working life. When applied to the workplace, Kaizen means continuing improvement involving everyone, managers and workmen alike.

The essence of Kaizen is simple and straightforward. Kaizen means improvement. The philosophy assumes that our way of life-working life or social life or home life needs to be constantly improved. The belief that there should be unending improvement is deeply ingrained in Japanese mentality. After World War, most Japanese companies had to start from the ground up. The managers went through new challenges every day and each day meant progress. It was also fortunate for Japan that experts such as Dr. Deming and Dr. Juran introduced the various tools that helped elevate the Kaizen concept to new heights. However most new concepts, systems and tools that are widely used in Japan today have, subsequently been developed in Japan and represent qualitative improvements upon the statistical quality control and total quality control of the 1960s.

Kaizen and Management: In Japan, management has two major components–maintenance and improvements. Maintenance refers to activities directed towards maintaining current

Notes

technological, managerial and operating standards and improvement refers to those directed towards improving current standards. Under the maintenance function, management performs the assigned tasks so that everybody in the company can follow the established Standard Operating Procedures (SOP) i.e. policies, rules, directives and procedures. Thus, in any business as employees work to maintain the standards, management helps by providing training and disciple. The improvement refers to improving the standards. The higher up the manager is, the more he is concerned with improvement. At bottom level an unskilled worker working on a machine may spend all his time following instructions. However, as he becomes more proficient at his work, he begins to think about improvement. He begins to contribute in the way his work is done, either through individual suggestions or through group suggestions.

Improving standard means establishing higher standards. Once this is done it is the management's job to see that the new standards are observed. Lasting improvement is achieved only when people work to higher standards. Maintenance and improvement have thus become inseparable for most Japanese managers. The improvement can be broken down between Kaizen and innovation. Kaizen signifies small improvements made in status quo as a result of ongoing efforts. Innovation involves improvement in the status quo as a result of large investment in new technology and/or equipment. In poorly managed companies, which do nothing, but maintenance, there is no internal drive for Kaizen or innovation and change is forced on management by market conditions and competitions.

Kaizen and TQC: The Total Quality Control (TQC) movement in Japan as part of Kaizen movement gives us a clear perspective of Japanese approach. It is important to note that TQC activities in Japan are not concerned solely with QC Japan has developed an elaborate system of Kaizen strategies on management tools with in the TQC movement. TQC in Japan is a movement centered on the improvement of managerial performance at all levels. It has typically dealt with; Quality assurance, Cost reduction, Meeting Production targets, Meeting delivery schedules, Safety, New product development, Productivity improvement, Supplier management.

Recently TQC has been applied for marketing sales and services as well. It has also been tried out for crucial management issues as organizational development, cross-functional management policy deployment, and quality deployment. In other words TQC is being used as a tool for improving overall performance.

Kaizen and Competition: Western managers who have had some business experience in Japan invariably remark on the intense competition among Japanese companies. This competition is thought to be the driving force of the Japanese companies. They compete for larger market shares through the introduction of new and more competitive products and by using and improving the latest technologies. Normally the driving forces for competition are price, quality and service. But now the companies are even competitive in introducing better and faster Kaizen programs.

Where profit is not an important criterion for business success, it can be considered that a company could remain unchanged for long time, but in situations as above improvement becomes an ongoing process. Kaizen ensures that there will be continuous improvement for improvement sake. Once the Kaizen movement is started there is no way to reverse the trend.

Caselet

Real-life Usage of Kaizen

Canon of Japan implemented in 1975 to excel over international competition and expand its operations on a global scale in 6 years. Canon put in place a special matrix management system with numerous small group activities. The purpose

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Notes

was to eliminate wastes, revitalize the workforce, and improve continuously in all business processes. Techniques like Canon Production System, Quality Assurance, Production Assurance, and Personnel Training were introduced. Canon achieved an astonishing 3% per month productivity increase.

Self Assessment

Fill in the blanks:

9. …….. means continuous improvement in personal life, social life and working life.
10. …….. refers to activities directed towards maintaining current technological, managerial and operating standards.
11. …… refers to those directed towards improving current standards.

9.5 Six Sigma Methodology

Six Sigma at many organizations simply means a measure of quality that strives for near perfection. Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects, driving towards six standard deviations between the mean and the nearest specification limit, in any process- from manufacturing to transactional and from product to service.

Six Sigma uses a variety of statistics to determine the best practices for any given process. Statisticians and Six Sigma consultants study the existing processes and determine the methods that produce the best overall results. Combinations of these methods will be tested and upon determining that a given combination can improve the process, it will be implemented.

Did u know? Six Sigma stands for "Six Standard deviations from the arithmetic mean".

Six Sigma statistically ensures that 99.9997% of all products produced in a process are of acceptable quality. Six Sigma allows only 3.4 defects per million opportunities. If a given process fails to meet this criterion, it is reanalyzed, altered and tested to find out if there are any improvements. If no improvement is found, the process is reanalyzed, altered and tested again. This cycle is repeated until you see an improvement.

Once an improvement is found, it is documented and the knowledge is spread across other units in the company so they can implement this new process and reduce their defects per million opportunities.

Table 9.1: Cost of Quality at Various Levels of Sigma

Sigma	Defect rate (PPM)	Cost of quality	Competitive level
6	3.4	<10%	World Class
5	233	10-15%	
4	6210	15-20%	Industry Average
3	66807	20-30%	
2	308537	30-40%	Non Competitive
1	6,90000	>40%	

The statistical representation of Six Sigma describes quantitatively how a process is performing. To achieve Six Sigma, a process must not produce more than 3.4 defects per million opportunities.

Notes

A Six Sigma defect is defined as anything outside of customer specifications. A Six Sigma opportunity is then the total quantity of chances for a defect. Process sigma can easily be calculated using a Six Sigma calculator.

The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction through the application of Six Sigma improvement projects. This is accomplished through the use of two Six Sigma sub-methodologies: DMAIC and DMADV. The six sigma DMAIC Process (define, measure, analyze, improve, control) is an improvement system for existing processes falling below specification and looking for incremental improvement. The Six Sigma DMADV process (define, measure, analyze, design, verify) is an improvement system used to develop new processes or products at Six Sigma quality levels. It can also be employed if a current process requires more than just incremental improvement. Both Six Sigma processes are executed by Six Sigma Green Belts and Six Sigma Black Belts, and are overseen by Six Sigma Master Black Belts.

Six Sigma experts (Green Belts and Black Belts) evaluate a business process and determine ways to improve upon the existing process. Six Sigma experts can also design a brand new business process using DFSS (Design For Six Sigma) principles. Typically it is easier to define a new process with DFSS principles than refining an existing process to reduce the defects. Six Sigma incorporates the basic principles and techniques used in Business, Statistics, and Engineering. These three form the core elements of Six Sigma. Six Sigma improves the process performance, decreases variation and maintains consistent quality of the process output. This leads to defect reduction and improvement in profits, product quality and customer satisfaction. Six Sigma methodology is also used in many Business Process Management initiatives these days. These Business Process Management initiatives are not necessarily related to manufacturing. Many of the BPM's that use Six Sigma in today's world include call centers, customer support, supply chain management and project management.

Customer requirements, design quality, metrics and measures, employee involvement and continuous improvement are main elements of Six Sigma Process Improvement.

The three key elements of Six Sigma are:

1. Customer Satisfaction
2. Defining Processes and defining Metrics and Measures for Processes
   a. Using and understanding Data and Systems
   b. Setting Goals for Improvement
3. Team Building and Involving Employees

Involving all employees is very important to Six Sigma. The company must involve all employees.

Notes Company must provide opportunities and incentives for employees to focus their talents and ability to satisfy customers.

Defining Roles: This is important to six sigma. All team members should have a well defined role with measurable objectives.

Even though Six Sigma was initially implemented at Motorola to improve the manufacturing process, all types of businesses can profit from implementing Six Sigma.

Businesses in various industry segments can definitely use Six Sigma principles to achieve higher quality.

Notes

Example: Call Centers, Insurance, Financial/Investment Services, E-commerce industry, Education

Many big businesses such as GE and Motorola have successfully implemented Six Sigma but the adaptation by smaller businesses has been very slow.

Some salient points from Six Sigma experience are summarized below.

- Bigger companies have resources internally who are trained in Six Sigma and also have 'Train the Trainer' programs using which they churn out many more Six Sigma instructors. Also many bigger companies encourage the employees to learn Six Sigma process by providing Green Belts/Black Belts as mentors.
- Effectively applying the Six Sigma techniques is difficult compared to actually learning the techniques in a class.
- Big companies make Six Sigma as part of the Goals for employees and provide incentives for employees who undergo training and mentor colleagues.
- Many assume that Six Sigma works for bigger companies only as they produce in volumes and have thousands of employees. This notion is not true and Six Sigma can be effectively applied for small businesses and even companies with fewer than 10 employees.

9.5.1 DMAIC

Motorola developed a five phase approach to the Six Sigma process called **DMAIC**.

- Define opportunities
- Measure performance
- Analyze opportunity
- Improve performance
- Control performance

Table 9.2: DMAIC Process

Stage	Phase	Objective
Identification	Identification	Identify key business issues
Characterization	Characterization	Understand current performance levels
Optimization	Optimization	Achieve breakthrough improvement
Institutionalization	Institutionalization	Integrate Six Sigma in day to day functioning

Self Assessment

Fill in the blanks:

12. ……. at many organizations simply means a measure of quality that strives for near perfection.
13. The fundamental objective of the Six Sigma methodology is the implementation of a ……. strategy that focuses on process improvement and variation reduction through the application of Six Sigma improvement projects.

Notes

14. Customer requirements, design quality, metrics and measures, employee involvement and continuous improvement are main elements of …….. Process Improvement.

15. Six Sigma was initially implemented at …….. to improve the manufacturing process.

9.6 WV Model of Continuous Improvement

TQM uses the phrase continuous improvement to present the idea of improvement as a problem-solving process. Continuous improvement is based on two major ideas – systematic or scientific based improvement and iterative improvement.

Continuous Improvement = Systematic Improvement + Iterative Improvement

The WV model is used in this section to illustrate the key issues of continuous improvement.

Improvement is derived from use of a scientific approach and tools and a structure for team or individual effort. A scientific approach considers a variety of possible solutions until the best – not just the most obvious – is identified factually. Structuring a team's effort facilitates the participation of all members, eliciting information from even the more reticent of them.

Having made a first step at improvement using these methods, repeat the methods to get continuous improvement. The WV model is not a prescription for making specific improvements – it is too abstract for that. Rather, it is an aid to understanding and remembering three generally used stages of quality improvement and quality maintenance. It also conveys the idea of moving systematically back and forth between abstract thought and empirical data during the process of solving a problem. Like all models, it is an abstraction and idealization, useful for figuring out where you are and where you need to get next.

The WV model depicts the overall form of problem solving as alternation between thought (rumination, planning, analyzing) and experience (getting information from the real world, e.g., through interview, experiments, or numerical measurements). The path between these two levels over time forms the shape of a W, then a V; hence the name WV.

For instance, you sense a problem and then collect data on where it might be; choose a specific improvement activity and then collect data on exactly what is wrong; plan a solution and then collect data to be sure it works; and then standardize on the new solution. The WV model reminds you not skip directly from "sense problem" to "standardize solution" - for example, from 'sales are down" to "reorganize the company"

In addition to illustrating the interplay between thought and experience, the WV model illustrates three types of problem solving.

The three types of improvement- process control, reactive improvement, and proactive improvement–are described below. Quality management started with process control in the United States in the 1930s and in Japan in the 1950s. Reactive improvement was added in the 1960s and 1970s, followed by proactive improvement in the 1980s.

Process Control: Assume that you have an effective standard process to perform some business or manufacturing function.

Caution You must monitor the process to make sure it is working as intended and bring it back into proper operation if it gets out of alignment.

Suppose a worker is charting her process with a control chart. In the figure, results of a process are plotted from left to right over time: the resulting chart highlights those results that exceed certain limits of acceptability.

Notes

If the process produces results that are out of its control limits, the worker takes corrective action as predetermined and described in the maintenance manual to correct the defect in the process. This cycle, known in TQM terms as the SDC (Standard, do check, act) cycle.

The basic idea is to have a standard process to check whether the product meets the specifications, and then to act to bring the process back to the standard. The concept is depicted as a cycle because one continues to apply the standard as long as the production procedure continues. This cycle to control or maintain the operation of a good process is known as process control. The monitoring system of process control includes use of inspection and some of the 7 QC tools.

Reactive Improvement: The next stage of the WV model addresses the improvement of a weak process. Suppose you have a specific process that simply is not good enough - there are many points outside the control limits. Suppose, even if the worker corrects the process according to the process manual, it repeatedly produces results that are out of its control limits. There is obviously something wrong with the process.

In this case, the worker must take data, analyze it, find the root causes of the problem, and implement appropriate counter measures. In other words, the workers react to a specific problem by using a problem-solving process to make the improvement–hence the name reactive. For this case, TQM has a specific standard methodology that is summarized in the steps below.

1. Select a theme (specific improvement, such as "decrease after-shipment bugs reported in product X"
2. Collect and analyze data (to discover what type of bugs occurs most often).
3. Analyze causes (to discover the root cause of the most frequent type of bug.
4. Plan and implement solution (to prevent the root cause from recurring).
5. Evaluate effects (to check the new data to make sure the solution worked).
6. Standardize solution (to permanently replace the process with the improved process).
7. Reflect on the process and the next problem to consider how the problem-solving process could have been executed and to decide which problem to work on now, say the second most frequent type of bug. Repeat from step 2 onwards.

These steps, known as the 7 improvement steps, are TQM's standard methodology for improving weak processes. The approach is known as reactive improvement, because it reacts to already existing weaknesses. Note that for a successful improvement, the last few steps become the SDCA cycle for maintaining the improvement. The 7 QC tools, and more sophisticated statistical tools such as multivariate analysis and experimental design are also frequently used in reactive problem solving.

Proactive Improvement: In many situations you do not start with a clear idea of a specific needed improvement. Rather you have to choose a direction for the company before starting an improvement activity. For instance, you may need to decide what the customer wants, which product to develop, or what process needs improvement most. This situation is addressed in the final portion of the WV model, known as proactive improvement.

At first you are only generally aware that there is a problem - you sense a problem. Then you explore the situation broadly to understand what is going on, what the customers appear to want, what you are able to build, what processes need fixing)? Having explored the situation broadly, you are in a position to formulate a problem, and then in many cases you can move into the 7 QC steps. The 7 management tools and QFD are useful for proactive improvement, especially in the initial steps.

Notes

At each stage in the WV model, as you move between formulating problems or solutions and taking data, you move between the upper and lower lines on the WV model, or the level of thought and the level of experience. In the proactive stage you have a feeling or image of a problem. You are at the level of thought. Next, take some data (for example, look at how the process or machine is actually operating) - you are at the level of experience. Continue to move back and forth: formulating a theme (thought), taking data upon which to base root cause analysis (experience), planning a solution (thought), taking data to confirm that the solution works (experience), and standardizing successful solutions (thought). This alternation between thought and experience illustrates the important TQM principle of basing actions on facts. At no time do you use speculation or opinion as the basis of decision-making.

Each of the three stages of the WV model uses a different kind of data. The data of proactive improvement is most often qualitative – in language, not numbers; its purpose may be unclear, the data is fuzzy and comes in many different forms, and you do not know in advance what kind of data you'll get. The data of reactive improvement comes in both numbers and language, but you try to eliminate the language by defining a purpose (theme), which can be handled numerically.

You can try an improvement and get real feedback regarding the direction and distance to targets or goals. It is important to get improved products or services rapidly to market or in the hands of the next process, in order to get this user feedback. In addition, PDCA (plan, do, check, act) is a system for making continuous improvements to achieve the target or ever-higher performance levels.

Self Assessment

Fill in the blanks:

16. …… is derived from use of a scientific approach and tools and a structure for team or individual effort.
17. The …….. depicts the overall form of problem solving as alternation between thought and experience.

Case Study

Kaizen Makes Things Work

A leading automotive company launched a three-week campaign where engineers across the organization came up with new ideas that saved the company more than $73 million that year. At an imaging-product organization, an annual exercise of generating 50 ideas per employee has resulted in an increase in productivity of 3 per cent per month.

Cut to 2005 — at a leading business process outsourcing (BPO) organization, an employee's idea to route calls directly between the agents telephone to the dialer resulted in reduction of telemarketing sales representatives' hang-up rates in excess of 50 per cent.

It is a revelation how the relatively ancient manufacturing sector has lessons for the so-called sunrise sector of business process outsourcing – or any organization. How at the heart of each is the commitment to the Japanese concept of "kaizen" and how both rest on

Contd…

Notes

the singular premise that continuous improvement can result if those involved in day-to-day operations can be energized to become stakeholders.

The idea to facilitate employee participation in such a manner traces its history to an old Japanese concept popularly referred to as kaizen (kai meaning change and zen implying good). While Kaizen is a way towards generating operational efficiencies by continuous improvement, the broader aim is to create a company culture that does not tolerate waste. Kaizen efforts typically start on the "gemba", which refers to the place where production takes place or value is added and extend across the entire enterprise.

Kaizen and Outsourcing

The rapid growth of the Indian outsourcing industry is not a simple result of low prices but a passion for quality wherein top-tier companies are continually looking at ways to improve delivery. Taking a page out of the hugely successful kaizen implementations at manufacturing units of the 1990s, Indian BPOs today are realizing that operational efficiency even in a people-oriented industry can result from creating a kaizen approach.

A key facet of kaizen is that it starts ground up. Kaizen necessitates the enthusiasm and contribution of the workforce to bring collective success. The objective is that every organization requires the coordinated effort and participation of its employees to scale new heights.

It is even more amazing to see what happens when the dynamism, youth and creativity of a young workforce is unleashed. We have found that involving our employees to generate new ideas can veritably result in an "idea factory" – a reservoir of ideas/best practices that can be tapped to replicate success stories across the organization.

Of course, ideas can fall in any of the well-documented categories. They could be continuous improvement or kaizen ideas, breakthrough/disruptive ideas and best practices that would help increase productivity and reduce costs. The rationale is to tap the creative potential of every single employee to continuously improve the particular activity, process or atmosphere. Based on the premise that every employee has dozens of ideas on how to improve the work processes and tasks that they are involved in, employees can make these incremental changes themselves, rather than relying on some remote, bureaucratic authority that may be solely looked upon as responsible for innovation or making those changes. With the programme actively involving the idea generator in the implementation phase, this brings a tremendous sense of empowerment and achievement. To say the least, employees who contribute innovative ideas and see them being implemented own the brand and build the organization.

Another aspect of the BPO industry that lends itself to the kaizen culture is the driving need for differentiation. With global delivery models in place, and being completely process driven, it is imperative for Indian BPOs to manage and retain huge scale and size. With not too many differentiators forthcoming, innovation or kaizen can emerge as the most important competitive advantage that enables a company to thrive in today's business environment. Some of the long-term benefits that would accrue as a result would be:

1. An innovative culture encourages people to put their thinking caps in place, make the workplace a healthier set up and control attrition
2. Long-lasting client relationships that create a differentiating edge for organizations in the global marketplace
3. Setting industry benchmarks and creating intellectual property creation in a new business era.

Contd...

Notes

To conclude, kaizen and the Indian BPOs are a seamless match. In a bid to constantly outperform and perfect routine and mundane tasks, organizations must continuously try to discipline and reinvent themselves in the process. Whether it is an auto manufacturer, an imaging-product company or a BPO organization, the rationale is simple – improve, innovate, reinvent – again, again and yet again.

Questions

1. Kaizen is useful in service organizations. Give justification for your answer if positive.
2. Explain the advantages of using Kaizen in knowledge intensive organizations.
3. Kaizen and Indian BPOs are a seamless match. How do you justify this statement?

Source: http://news.zdnet.com/2100-9589_22-144700.html

9.7 Summary

- Organizations should strive to achieve perfection by continuously improving the business and production processes.
- Process refers to business and production activities of an organization.
- Business processes such as purchasing, engineering, accounting, and marketing are areas where non-conformance can present an opportunity for substantial improvement.
- Juran Trilogy has three components: planning, control, and improvement.
- Control is used by operating forces to help meet the product, process, and service requirements. It uses the feedback loop.
- Process improvements begin with the establishment of an effective infrastructure such as quality council.
- The PDCA model provides a framework for the improvement of a process or system.
- Kaizen means continuous improvement involving everyone, managers and workmen alike.
- Maintenance refers to activities directed towards maintaining current technological, managerial and operating standards and improvement refers to those directed towards improving current standards.
- Lasting improvement is achieved only when people work to higher standards.
- Six Sigma uses a variety of statistics to determine the best practices for any given process.
- Six Sigma stands for "Six Standard deviations from the arithmetic mean".
- The statistical representation of Six Sigma describes quantitatively how a process is performing.
- The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction through the application of Six Sigma improvement projects.
- The Six Sigma DMADV process (define, measure, analyze, design, verify) is an improvement system used to develop new processes or products at Six Sigma quality levels.
- Six Sigma experts (Green Belts and Black Belts) evaluate a business process and determine ways to improve upon the existing process.

Notes

- Customer requirements, design quality, metrics and measures, employee involvement and continuous improvement are main elements of Six Sigma Process Improvement.
- Continuous improvement is based on two major ideas – systematic or scientific based improvement and iterative improvement.

9.8 Keywords

Benchmarking: Benchmarking refers to a standard by which something can be measured or judged.

Budgeting: Budgeting refers to the planned level of expenditures, performance, or number of full-time equivalent positions for a particular fiscal year.

Continuous Process Improvement: It is a never-ending effort to expose and eliminate root causes of problems; small-step improvement as opposed to big-step improvement.

Experimental Design: Experimental design a research design to investigate cause-and-effect relationships between interventions and outcomes.

Kaizen: Kaizen is a Japanese business philosophy of continuous improvement of working practices, personal efficiency, etc.

Pareto Chart: A graphical statistical technique used to tally data in descending or ascending frequency order is referred to as Pareto chart.

PDSA Cycle: It refers to a structured trial of a process change.

Quality Function Deployment: A visual decision-making procedure for multi-skilled project teams which develops a common understanding of the voice of the customer and a consensus on the final engineering specifications of the product that has the commitment of the entire team is known as quality function deployment.

Six Sigma: Six sigma is a quality-improvement performance measurement system that stresses the continual improvement of business processes through reduction of errors.

Statistical Process Control: Statistical Process Control (SPC) is the application of statistical methods to the monitoring and control of a process to ensure that it operates at its full potential to produce conforming product.

9.9 Review Questions

1. What do you understand by continuous process improvement?
2. What is meant by process? What are the five basic ways of improvement?
3. Briefly describe Juran Trilogy with the help of a suitable diagram.
4. Who formulated the PDCA cycle? Mention its key points.
5. Explain Kaizen with reference to management and TQC.
6. Discuss Six-Sigma methodology. Explain its key elements.
7. What do you understand by DMAIC?
8. Explain WV Model of Continuous Improvement.
9. What are the three types of improvement? Explain briefly.
10. Write a short note on:
    (a) Control
    (b) Kaizen and competition

Notes

(c) DMADV

(d) Proactive improvement

Answers: Self Assessment

1. Continuous improvement
2. Process
3. Planning
4. External
5. Walter Shewhart
6. Process
7. Study the results
8. Brainstorming
9. Kaizen
10. Maintenance
11. Improvement
12. Six Sigma
13. Measurement-based
14. Six Sigma
15. Motorola
16. Improvement
17. WV model

9.10 Further Readings

Books

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Online links

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Notes

Unit 10: Benchmarking

CONTENTS

Objectives
Introduction
10.1 Definition
10.2 Levels of Benchmarking
10.2.1 Strategic Benchmarking
10.2.2 Operational Benchmarking
10.3 Types of Benchmarking
10.4 Benefits of Benchmarking
10.5 Process of Benchmarking
10.5.1 Xerox Twelve-step Process
10.5.2 AT&T and Other Processes
10.5.3 Motorola's 5-step Process
10.6 Cost of Benchmarking
10.7 Technical Benchmarking/Product Benchmarking
10.8 Metric Benchmarking
10.9 Reasons for Benchmarking
10.10 Implementation of Benchmarking
10.11 Some Dangers of Benchmarking
10.12 Summary
10.13 Keywords
10.14 Review Questions
10.15 Further Readings

Objectives

After studying this unit, you will be able to:

- Define benchmarking
- Discuss the reasons for benchmarking
- Explain the levels and types of benchmarking
- Explain the benefits of benchmarking
- Elaborate the process of benchmarking
- Discuss the cost of benchmarking

Introduction

In the previous unit, we dealt with the concept of continuous process improvement. We also saw the various techniques applied in CPI such as Juran's trilogy, Kaizen, Six Sigma, etc.

In this unit, we will learn about benchmarking, reason for benchmarking and the process for it.

Notes

Organizations need to improve continuously in various areas to keep them in a competitive position. They can learn from various sources for their continuous improvement. Learning can be from both internal and external sources. Many firms choose to compare their performance against that of another firm in order to learn how they are performing in the market place. This can help them measure not only in understanding their current performance, but also help them in best practices in other organizations from which they can learn and improve. Thus benchmarking best industry practices is one of the popular quality management methodology used by organizations all over the world. Xerox was the first organization which initiated benchmarking concept and it went on win Malcolm Baldrige National Quality Award. Xerox basically studied best practices of its competitors to learn and improve its own performance. Since then many other organizations have used benchmarking as tool for quality and productivity improvement.

10.1 Definition

Benchmarking is the systematic and continuous process of determining what the best performances and underlying skills of leading organizations are in their pursuit of excellence, and based on this, of stimulating the organization's own strife for excellent performance at all organizational levels–Camp.

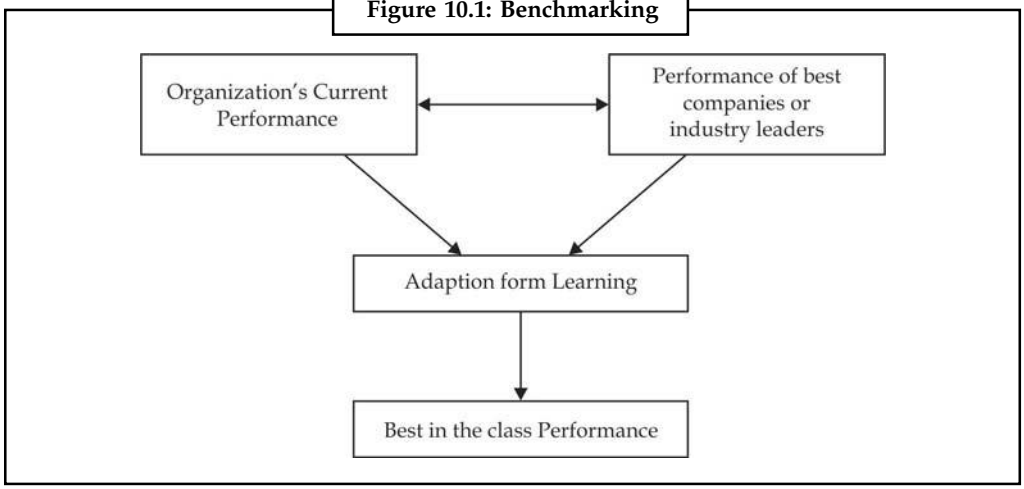
Benchmarking involves management identifying the best firms in their industry, or any other industry where similar processes exist, and comparing the results and processes of those studied (the "targets") to one's own results and processes to learn how well the targets perform and, more importantly, how they do it.

Did u know? The term benchmarking was first used by cobblers to measure people's feet for shoes. They would place someone's foot on a "bench" and mark it out to make the pattern for the shoes.

Benchmarking is most used to measure performance using a specific indicator (cost per unit of measure, productivity per unit of measure, cycle time of x per unit of measure or defects per unit of measure) resulting in a metric of performance that is then compared to others.

"Benchmarking is a continuous, systematic process of evaluating and comparing the capability of one organization with others normally recognized as industry leaders, for insights for optimizing the organizations processes."

Figure 10.1: Benchmarking



Notes

Self assessment

Fill in the blanks:

1. ……. was the first organization which initiated benchmarking concept.
2. The term …… was first used by cobblers to measure people's feet for shoes.

10.2 Levels of Benchmarking

Benchmarking is a tool to achieve business and competitive objectives. It can inspire managers and organizations to compete. It is powerful and extremely effective when used for the right reasons and aligned with organization strategy.

The two levels of benchmarking are:

1. Strategic Benchmarking and
2. Operational Benchmarking

10.2.1 Strategic Benchmarking

Strategic benchmarking deals with to management and looks at what strategies the organizations are using to make them successful. It focuses on how companies compete and deals with long-term results. It is using best practices to develop corporate, program, product strategies and results. Most Japanese firms use this technique as they focus on long-term results.

Notes Strategic Benchmarking must begin with the assessment of the needs and expectations of the customer.

Customer Surveys may be conducted to measure customer satisfaction and the gaps between a company's performance and its customer's standards.

Strategic Benchmarking involves studying of corporate level strategies of successful organizations and comparing it with the organizational strategy to get the additional insights. These strategies are analyzed with particular reference to:

- Strategic intent
- Core competencies
- Process line
- Strategic alliances and
- Technology portfolio etc.

Identifying the process outputs most important to the customers (key quality characteristics) of that process is the first step. This step applies to every organizational function, since each one has outputs and customers. The QFD/customer needs assessment is a natural precursor to benchmarking activities.

Strategic Benchmarking includes:

- The strategic study of the characteristics of effective continuous improvement strategies of public and private organizations, of change processes, of leadership styles, etc, to establish a vision, strategies, leadership competencies, client benefit results;

Notes

- Specific studies of the strategies and approaches of high performing organizations;
- Studies of trends and orientations as guide to actions, e.g., technological trends.

10.2.2 Operational Benchmarking

Operational Benchmarking is assessing and implementing the best practices of industry or public service leaders to improve processes to the extent possible to meet organizational goals.

It includes:

- Creating awareness and support at the senior executive level, and establishing dedicated benchmarking resources;
- Building benchmarking into business planning and continuous improvement;
- Establishing operational performance levels to sustain competitive advantages;
- Using a systematic, multi-step benchmarking process to improve business and work processes, and internal and external customer satisfaction.

After a benchmark has been identified, the goal is to meet or exceed that standard through improvements in appropriate process. One of the early steps in any effort is to understand the current performance. The tools commonly used for benchmarking are;

- Process study and analysis
- Process re-engineering
- Quality costs analysis
- Quality function deployment
- Value engineering and value analysis

Self Assessment

Fill in the blanks:

3. ……. is a tool to achieve business and competitive objectives.
4. …… benchmarking deals with to management and looks at what strategies the organizations are using to make them successful.
5. Strategic Benchmarking involves studying of …… level strategies of successful organizations and comparing it with the organizational strategy to get the additional insights.
6. ……. Benchmarking is assessing and implementing the best practices of industry or public service leaders to improve processes to the extent possible to meet organizational goals.

10.3 Types of Benchmarking

Benchmarking can be used in several ways. Depending ways of benchmarking or the content of benchmarking; benchmarking can be classified into several categories. Popular methods of benchmarking are discussed below:

1. ***Competitive benchmarking:*** Competitive benchmarking is the process of benchmarking on the products or services of a company's competitor's. Xerox used competitive benchmarking to make itself more competitive.

Notes

2. ***Generic benchmarking:*** Generic benchmarking is the process of evaluating processes or business functions against the best companies, regardless of their industry. Thus any organization related any industry can learn from any other organization in different industry certain best practices in different functional areas.
3. ***Strategic benchmarking:*** It is the process of improving organization's long-term strategies and general approaches to enable higher performance in various areas like core competencies, products, services, etc. by learning from best in the world.
4. ***Process benchmarking:*** It is the process where a specific critical process improvement is focused and organizations can learn the best process from by comparing their processes with best managed companies.
5. ***Functional benchmarking:*** It is the process of benchmarking in particular functional areas of business to improve organizational performance.
6. ***Internal benchmarking:*** It is the process of learning from within the organization. Any part of Organization can benchmark any process or activity from different departments or business units within the organization. This is very useful for enhancing performance in all business units and departments of an organization. This is very popular in large organizations.
7. ***External benchmarking:*** It is the process in which organizations learn from benchmarking with other organizations outside in any area.
8. ***International benchmarking:*** It is the process of benchmarking in which best practices outside the country in any part of the world are identified for an organization's improvement.
9. ***Product Benchmarking:*** Product benchmarking is simply comparing the performance, features and customer acceptance of competing products. It involves a comparison between difference features and attributes of competing products. Product benchmarking is commonly known as reverse engineering or competitive product analysis or customer satisfaction benchmarking.
10. ***Performance Benchmarking:*** Performance benchmarking is an important technique secures external involved in the processes or feedback to the concerned persons involved in the processes or activities. It focuses on assessing competitive positions through comparing the products and services of other competitors. It investigates the performance of core business functions but does not need to focus on direct competition. Performance benchmarking is a comparison indicator of a business as a whole, or divided into critical functions and processes. It usually focuses on elements of price, technical quality ancillary product or service features, speed, reliability, and other performance characteristics.
11. ***Collaborative Benchmarking:*** Benchmarking was originally invented as a formal process by Rank Xerox, is usually carried out by individual companies. Sometimes it may be carried out collaboratively by groups of companies (e.g., subsidiaries of a multinational in different countries).

Example: The Dutch municipally-owned water supply companies have carried out a voluntary collaborative benchmarking process since 1997 through their industry association. And the UK construction industry has carried out benchmarking since the late 1990s again through its industry association and with financial support from the UK Government.

Task Make a presentation on the types of benchmarking. Also mention the industries and the companies using these benchmarking methods.

Notes

Self Assessment

Fill in the blanks:

7. ……. benchmarking is the process of benchmarking on the products or services of a company's competitor's.
8. ……. is the process of improving organization's long-term strategies and general approaches to enable higher performance in various areas.
9. ……. benchmarking is the process of evaluating processes or business functions against the best companies, regardless of their industry.
10. ……. is the process in which organizations learn from benchmarking with other organizations outside in any area.
11. Product benchmarking is simply comparing the performance, features and customer acceptance of …… products.

10.4 Benefits of Benchmarking

Benchmarking, as we know, is an improvement tool. It is neither a strategy nor a philosophy. The benefits of it, provided used properly are enormous. Some of the main benefits are:

- Source of innovation.
- Measurable goals and objectives.
- Understanding present performances in measurable terms.
- Awareness about the best practices.
- Accelerate positive change.
- Achievement of standards of excellence.
- Provides SWOT analysis of the company.
- Generates employee involvement.
- Improving organizations bottom line through cost-benefits analysis.
- Improves quality of management through information exchange.

In 2008, a comprehensive survey on benchmarking was commissioned by The Global Benchmarking Network, a network of benchmarking centers representing 22 countries. Over 450 organizations responded from over 40 countries. The results showed that:

1. Mission and Vision Statements and Customer (Client) Surveys are the most used (by 77% of organisations) of 20 improvement tools, followed by SWOT analysis (72%), and Informal Benchmarking (68%). Performance Benchmarking was used by (49%) and Best Practice Benchmarking by (39%).
2. The tools that are likely to increase in popularity the most over the next three years are Performance Benchmarking, Informal Benchmarking, SWOT, and Best Practice Benchmarking. Over 60% of organizations that are not currently using these tools indicated they are likely to use them in the next three years.

Notes

Case Study

Benchmarking: The Politics of Envy

Let's start with a controversial statement: 'envy is a very good thing'. Sounds like a good subject for a business school debate doesn't it? How often have you looked enviously or admiringly at the car someone's driving, or the shoes they're wearing, or the ease with which they carry themselves? Some people might describe that envy as negative, but if it results in you doing something in an improved way, isn't that positive?

Gary Hamel said: "My fundamental belief is that if a company wants to see the future, 80 per cent of what it is going to have to learn will be from outside its own industry." I contend that the motivation for that learning is provided by a feeling of discontent with where you are at present; and that feeling of discontent is something that has to be fostered if complacency isn't to set in.

The conclusions of research carried out by the London Business School on behalf of the CBI in 1997 are as true today as they were then—in essence the research found that the more complacent an organisation, the less effective it is in delivering service. It also found that there is a direct positive correlation between an organisation's service performance and the amount of benchmarking it does. In other words, the more benchmarking you do the better your performance!

Lawler & Worley, in *Built to Change*, articulated a major temptation for organisations to "institutionalise best practices, freeze them into place, focus on execution, stick to their knitting, increase predictability and get processes under control". These ideas are all premised on stability and consistency as the keys to effective performance. Organisations are positively encouraged through the deployment of models and templates to support enduring values, stable strategies and bureaucratic structures, not to change—in short, to set best practice in aspic!

So how then do organisations overcome complacency and inertia? My favoured way is benchmarking, i.e. learning what others do and the appropriate application of that learning to your own organisation in order to improve performance. A simple definition is: benchmarking = comparative analysis + improvement action.

Benchmarking activities are either informal or formal. The former, most of us do unconsciously and is the constant comparing and learning from the behaviour and practices of others. This learning can come from talking to peers within your own organisations, consulting with experts, online and face-to-face networking with people from other organisations, or using online databases that share benchmarking information.

Informal benchmarking remains extremely popular for effective performance improvement. Recent research among the Best Practice Club's membership indicated common key areas of focus in operational efficiency, cost management, employee engagement in difficult times, and the environment. All respondents stated they would be carrying out benchmarking in the next 12 months to help them address those areas of focus and the vast majority of that benchmarking would be informal. In a typical year the Club receives around 150 benchmarking requests of all types and well over 90 per cent of all delegates attending Club workshops state they will make changes to their organisations as a direct result of their attendance. I suggest that in today's challenging economic climate, such cost effective methods of performance improvement will be even more popular.

As for formal benchmarking, there are two types: performance and best practice. In the vernacular, the first is about 'what' and the second is about 'how'.

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Performance benchmarking is the comparative analysis of key measures of performance from similar activities and, if that analysis reveals shortcomings in performance, can often be a very good 'driver for change'. Unfortunately a significant number of organisations consider this comparative analysis to be all that's involved in benchmarking and thus do little more than collect 'league table' information about themselves, carrying out any improvement projects as separate and detached activities. This situation can often be found in organisations where 'politically' or 'regulatory' defined measures are used by external stakeholders to judge their performance. The risk that is run here is that of a disconnect between the impact of the improvement interventions made and the defined measures. Another common occurrence in such cases is the inordinate amount of time and effort that is put into ensuring the measures used are consistent across the reference group used, i.e. the perennial problem of ensuring 'apples with apples' comparisons.

Best practice benchmarking, as defined by the Centre for Organisational Excellence Research (COER), is: "The comparison of performance data obtained from studying similar processes or activities and identifying, adapting and implementing the practices that produce the best performance results." As such, it is an extremely powerful process improvement methodology. However it should be noted that this type of formal benchmarking is resource-intensive and typical projects take from two to four months to identify best practices. Given the level of investment, care must be taken to ensure project focus is aligned with strategic intent and maintained throughout its life.

A classic example of formal best practice benchmarking is that of Xerox. In the late 1970s it faced stiff competition from Japan and, unsettled by the success of its competitors, it compared its performance in a number of key areas. Its findings included:

- Key competitors had a ratio of indirect to direct staff of half its own
- It had nine times the number of production suppliers
- It's time to market for products was double that of the competition
- Its defect rate was seven times worse

You can imagine the unsettling effect that this comparative analysis had on the Xerox executives! The organisation embarked on a massive programme of learning, predominately from outside of its own industry, to identify and implement best practice. And the success it had is well documented.

A recent study conducted by COER, on behalf of the Global Benchmarking Network (GBN), involved nearly 500 organisations that used best practice benchmarking and this indicated an average financial return per project of $100,000 to $150,000 with some reaping benefits of more than $1,000,000.

The wide appeal and acceptance of benchmarking has led to various processes emerging. COER's TRADE, as recognised by the UK Benchmarking Institute, is one such methodology. It consists of five stages:

- **T**erms of Reference (aims, objectives, scope, resources, cost/benefit analysis)
- **R**esearch (current performance)
- **A**ct (data collection and comparative analysis)
- **D**eploy (communicate and implement best practices)
- **E**valuate (review process and outcomes to ensure aims met)

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Notes

Many benchmarking gurus advocate a 10-step generic process that includes:

- Select process to benchmark
- Put in place resources
- Plan bencharking project
- Train staff
- Research and engage partners
- Collect and exchange data
- Analyse gap/s
- Adapt superior practice
- Develop and implement new process

Review Results

Most organisations' benchmarking teams are small (typically less than four people), so if you are considering formal benchmarking then please ensure that you've thoroughly prepared the ground and put in place the critical success factors necessary for you to succeed. Below is a summary of the critical success factors for effective benchmarking identified by Keki Bhote, courtesy of the Best Practice Club knowledge base.

- Tie in with strategy or goals
- Win top management support
- Tie in with other improvements
- Establish a robust infrastructure
- Get the planning right
- Link to key business outcomes
- Link internal customers to project
- Pick the right project team
- Get help from support services
- Get training for the project team
- Benchmark internally to 'know yourself'
- Run a pilot project
- Pick the right partners
- Use and test a questionnaire
- Plan on site visits thoroughly
- Be prepared for defeatism/scepticism
- Communicate your findings
- Repeat the process

Finally, the keyword in all benchmarking projects for me is 'adapt'. No two organisations are exactly the same and what works in one organisation may not do so in another. Best practice always has to be adapted to the organisation concerned. Done well, best practice benchmarking is a force multiplier in the performance improvement world; but done badly it can be little more than an expensive ego massaging device.

Question:

Critically analyse the above case.

Source: http://www.bus-ex.com/article/strategy-benchmarking

Self Assessment

Notes

Fill in the blanks:

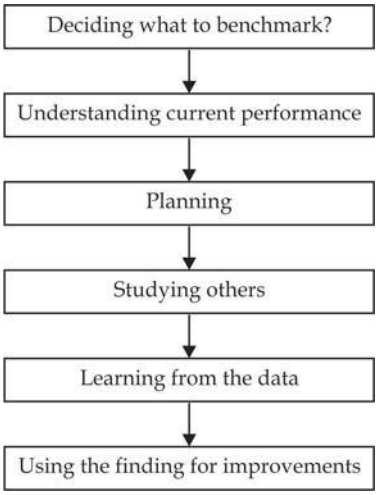
12. Benchmarking is a/an …… tool.

10.5 Process of Benchmarking

There is no specific procedure for benchmarking and organizations can design their own method of benchmarking and hence it may vary from organization to organization. But in general the process of benchmarking may consist of the following steps as shown in the Figure 10.2.

The various steps of benchmarking process are explained below:

Figure 10.2: Process of Benchmarking



Deciding what to Benchmark?: Benchmarking can be applied to any business process or function of the organization.

Notes The selection of area for benchmarking must be based on the business strategy of the organization. Thus the area chosen for improvement must be in line with business strategy.

Understanding Current Performance: Self analysis is an essential step for benchmarking process. Every organization which would like to benchmark must have clear knowledge about its own processes, products and services before it can compare itself with another organization. Hence it is necessary for the organization to first document its processes. Techniques like flow diagrams, cause-effect diagrams, etc. can be used for understanding current level of performance in the chosen areas for improvement.

Planning for Improvement: Planning phase determines how to conduct benchmarking study. Organization has to select be benchmarking team and team has to make decisions on benchmarking and these decisions include type of benchmarking, the data required for benchmarking, method of data collection and which are the organizations which can be selected for benchmarking study from which this data is to be selected.

Notes

Thus first step in planning is to determine type of benchmarking. Thus organization has to determine whether to use internal benchmarking, competitive benchmarking or process benchmarking. Internal benchmarking can be very much useful for large organizations with several business units to learn best practices within the organization.

Studying Others: Once an organization is selected for benchmarking, the next step is to study its best practices. Study should focus on how best in the class processes are performed and what are the ways of measuring outcomes or results of these processes.

Learning from the Data: Once sufficient data is collected about the process or functional area selected, the benchmarking team can use the information for the analysis. This analysis should lead to what the organization can learn from the best in the class. It must identify gaps between the organization's performance with that of the best in the class organizations. It must also reveal the amount of gap and possible reasons for the gap. It should also reveal quantum of future improvements if these practices are learned form the best in the class and implemented successfully from the process of benchmarking.

Using the Findings for Future Improvement: When the benchmarking study reveals the performance gaps, then the outcomes of benchmarking study identifies the actions for future improvement. Successful changes need a clear communication about the need for changes from the benchmarking team to all those people who may be involved in the change process.

Caution The changes process must identify definite goals for improvement, and prepare action plans for implementing improvement projects.

10.5.1 Xerox Twelve-step Process

The pioneer of Benchmarking Robert Camp (Manager of Benchmarking Competency Quality and Customer Satisfaction at Xerox) lists the benchmarking process in five phases. These five phases are divided into 12 steps as under:

1. ***Planning:*** This includes the following three steps:
   (a) Identify what is to be benchmarked
   (b) Identify comparative companies
   (c) Determine data collection method and collect data
2. ***Analysis:*** This includes the following two steps:
   (a) Determine current performance "gap"
   (b) Project future performance levels
3. ***Integration:*** This includes the following two steps:
   (a) Communicate benchmark findings and gain acceptance
   (b) Establish functional goals
4. ***Action:*** This includes the following three steps:
   (a) Develop action plans
   (b) Implement specific actions and monitor progress
   (c) Recalibrate benchmarks

Notes

5. ***Maturity:*** This includes the following two steps:
   (a) Leadership position attained
   (b) Practices fully integrated into process.

10.5.2 AT&T and Other Processes

Two-tune, Baldrige Award winning AT&T, an active bench marker, has developed a nine-step model as under:

1. Identify what to benchmark
2. Develop a benchmarking plan
3. Choose data collection method
4. Collect data
5. Choose best-in-class companies
6. Collect data during a site visit
7. Compare processes, identify gaps, and develop recommendations
8. Implement recommendations
9. Recalibrate benchmarks

10.5.3 Motorola's 5-step Process

1. Decide what to benchmark
2. Fined companies to benchmark
3. Gather data
4. Analyse data and integrate results into action plans
5. Recalibrate and recycle the process

Although the number of steps in the process may vary from organisation to organisation, the following six steps contain the core techniques.

1. Decide what to benchmark.
2. Understand current performance.
3. Plan
4. Study others
5. Learn from the data.
6. Use the findings.

Self Assessment

Fill in the blanks:

13. ……. can be applied to any business process or function of the organization.
14. …….. is an essential step for benchmarking process.

Notes

15. …… phase determines how to conduct benchmarking study.
16. First step in planning is to determine ……. of benchmarking.
17. When the benchmarking study reveals the……, then the outcomes of benchmarking study identifies the actions for future improvement.

10.6 Cost of Benchmarking

The three main types of costs in benchmarking are:

- ***Visit Costs*:** This includes hotel rooms, travel costs, meals, a token gift, and lost labor time.
- ***Time Costs*:** Members of the benchmarking team will be investing time in researching problems, finding exceptional companies to study, visits, and implementation. This will take them away from their regular tasks for part of each day so additional staff might be required.
- ***Benchmarking Database Costs*:** Organizations that institutionalize benchmarking into their daily procedures find it is useful to create and maintain a database of best practices and the companies associated with each best practice now.

The cost of benchmarking can substantially be reduced through utilizing the many internet resources that have sprung up over the last few years. These aim to capture benchmarks and best practices from organizations, business sectors and countries to make the benchmarking process much quicker and cheaper.

10.7 Technical Benchmarking/Product Benchmarking

The technique initially used to compare existing corporate strategies with a view to achieving the best possible performance in new situations (see above), has recently been extended to the comparison of technical products. This process is usually referred to as "Technical Benchmarking" or "Product Benchmarking". Its use is particularly well developed within the automotive industry (Automotive Benchmarking), where it is vital to design products that match precise user expectations, at minimum possible cost, by applying the best technologies available worldwide. Many data are obtained by fully disassembling existing cars and their systems. Such analyses were initially carried out in-house by car makers and their suppliers. However, as they are expensive, they are increasingly outsourced to companies specialized in this area. Indeed, outsourcing has enabled a drastic decrease in costs for each company (by cost sharing) and the development of very efficient tools (standards, software).

Self Assessment

Fill in the blanks:

18. The cost of benchmarking can substantially be …… through utilizing the many internet resources that have sprung up over the last few years.
19. The technique used for the comparison of technical products is usually referred to as …….. Benchmarking.

10.8 Metric Benchmarking

Another approach to making comparisons involves using more aggregate cost or production information to identify strong and weak performing units. The two most common forms of quantitative analysis used in metric benchmarking are Data Envelope Analysis (DEA) and

Notes

regression analysis. DEA estimates the cost level an efficient firm should be able to achieve in a particular market. In infrastructure regulation, DEA can be used to reward companies/operators whose costs are near the efficient frontier with additional profits. Regression analysis estimates what the average firm should be able to achieve. With regression analysis firms that performed better than average can be rewarded while firms that performed worse than average can be penalized. Such benchmarking studies are used to create yardstick comparisons, allowing outsiders to evaluate the performance of operators in an industry. A variety of advanced statistical techniques, including stochastic frontier analysis, have been utilized to identify high performers and weak performers in a number of industries, including applications to schools, hospitals, water utilities, and electric utilities.

One of the biggest challenges for Metric Benchmarking is the variety of metric definitions used by different companies and/or divisions. Metrics definitions may also change over time within the same organization due to changes in leadership and priorities. The most useful comparisons can be made when metrics definitions are common between compared units and do not change over time so improvements can be verified.

Self Assessment

Fill in the blanks:

20. The two most common forms of quantitative analysis used in …….. benchmarking are Data Envelope Analysis and regression analysis.
21. ……. analysis estimates the cost level an efficient firm should be able to achieve in a particular market.
22. ……. analysis estimates what the average firm should be able to achieve.

10.9 Reasons for Benchmarking

Continuous improvement is the most important need for any organization to remain competitive and to satisfy changing needs of customers. Originations have to either innovate, develop new processes, products and methods for improvement or they can also learn from the best in the world. Thus benchmarking becomes an important requirement for every organization. Benchmarking thus is used to measure key performance and compare it with others so that an organization can determine where it needs to improvement and what the future opportunities for improvement are. Sometimes benchmarking can also be used by an organization to determine whether it is able to meet customer expectations. It can be also used to determine how an organization is able to comply with standards. This helps the organizations to implement quality management systems like ISO 9000. Thus in general it is the benchmarking which helps organizations to determine areas for future improvement to remain competitive in the market.

The following benefits can be reaped from benchmarking.

a. Learning from best practices from any industry and incorporating them for improvement
b. Helping an organization to understand its current performance
c. Encouraging for continuous improvement projects
d. Improved customer satisfaction
e. Improves competitiveness
f. Enhances productivity
g. Helps in thinking out of box
h. Stimulates motivation among the employees

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Self Assessment

Fill in the blanks:

23. …… improvement is the most important need for any organization to remain competitive and to satisfy changing needs of customers.

24. ……. can be used by an organization to determine whether it is able to meet customer expectations.

10.10 Implementation of Benchmarking

Implementation of benchmarking in an organisation can be achieved in the following five stages:

1. ***Planning Stage*:** For the success of any benchmarking endeavour, careful planning and preparation is a prerequisite. The planning stage primarily involves ensuring the top management commitment and then having a mission statement developed by them. This will lead to identifying the champions from the top management and to put together a core team, which will look after the endeavour. Finally, the core team has to decide about the scope of the endeavour and have timeframe decided for it. While fixing the scope and the timeframe the team has to see that what has been fixed is not too much optimism but a realistic and measurable goal.

   Any timeframe which is too short becomes unachievable and anything which is too long becomes monotonous in both aspects. It reduces the motivation and enthusiasm of the people involved in it, who in turn start looking for shortcuts to complete it.

2. ***Analysis Stage*:** As the implementation effort moves into the second stage of analysis, the important aspects to be handled are to perform a thorough research of the information available from all sources that can be tapped, to identify the actual customers, both internal and external who are going to be affected as a result of this benchmarking exercise, and finally to identify the benchmarking partners. Here, one thing is to be ensured that the comparison is not going to be between apples and oranges. For example, if an organisation is looking forward for an improvement, to be a better wealth creator for its shareholders it cannot benchmark itself with the best of the employers of India, as among the top ten of both the categories in India, as per the latest survey conducted in early 2002, there are only three common organisations. Thus we see that the shareholder perception is almost totally different from employees perception.

3. ***Integration Stage*:** After identifying what is to be delivered, who are going to be affected, who are going to be the benchmarking partners and finally getting relevant data through proper screening of available information one can move into the third stage of implementation of developing right measures and identifying right tools and techniques to be used to proceed with the project. During the stage, it is to be looked after that different organisations operate differently, hence measures can also be applied in a different manner. Tools and techniques are to be improved upon, which will help in developing right measures. One of the common mistake on organisation makes is to benchmark against not the best but the most convenient. The members of the core team has to resist the temptation of convenience. Benchmarking against the average organisations is a pointless exercise.

4. ***Action Stage*:** The next stage of implementation of benchmarking endeavour is the action stage. In this stage, analysis of the relevant data is collected vis-à-vis the measures developed. This process helps in eliminating not to be compared facts, figures and practices, and actually on which action has to be initiated. One has to be clear, that various organisations

may be best in several processes. No organisation can claim to be perfect in all the areas. Another thing to be undertaken in the action stage is to look for structured visits and to conduct interviews on one-to-one basis through physical presence. Seeing is believing is the mantra. Brainstorming is an effective tool to reach conclusions.

5. ***Maturity Stage*:** The final stage for benchmarking endeavour looks for the end recommendations that are to be implemented and the actual implementation. It also looks forward towards monitoring the new performance levels to be achieved on an ongoing basis i.e. benchmark again and again. "Benchmarking is a Continuous Learning Experience."

Self Assessment

Fill in the blanks:

25. The ……. stage primarily involves ensuring the top management commitment and then having a mission statement developed by them.

26. In ……. stage, analysis of the relevant data is collected vis-à-vis the measures developed.

10.11 Some Dangers of Benchmarking

Benchmarking is based on learning from others, rather than developing new and improved approaches. Since the process being studied is there for all to see, a firm will find that benchmarking cannot give them a sustained competitive advantage. Although helpful, benchmarking should never be the primary strategy for improvement.

Competitive analysis is an approach to goal setting used by many firms. This approach is essentially benchmarking confined to one's own industry. Although common, competitive analysis virtually guarantees second-rate quality because the firm will always be following their competitors. If the entire industry employs the approach it will lead to stagnation for the entire industry, setting them up for eventual replacement by outside innovators.

Self Assessment

Fill in the blanks:

27. Although helpful, ……. should never be the primary strategy for improvement.

28. ……. analysis is an approach to goal setting used by many firms.

Caselet

Xerox Benchmarking

Possibly the best-known pioneer of benchmarking in Europe is Rank Xerox, the document and imaging company, which created the original market for copiers. The virtual monopoly the company had in its sector almost became its undoing, however. Spurred by the threat from the emerging Japanese copier companies, an in-depth study within the company recognized that fundamental changes were needed. To understand how it should change, the company decided to evaluate itself externally – a process which became known as competitive benchmarking. The results of this study

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shocked the company. Its Japanese rivals were selling machines for about what it cost Xerox to make them. Nor could this be explained by differences in quality. The study found that, when compared with its Japanese rivals, the company had nine times more suppliers, was rejecting 10 times as many machines on the production line and taking twice as long to get products to market. Benchmarking also showed that productivity would need to grow 18 per cent per year over five years if it was to catch up with its rivals.

Rank Xerox sees benchmarking as helping it achieve two objectives. At a strategic level it helps set standards of performance, while at an operational level it helps the company understand the best practices and operations methods which can help it achieve its performance objectives. The benchmarking process developed by Rank Xerox has five phases.

Its experience of using this approach has led Xerox to a number of conclusions:

- The first phase, planning, is crucial to the success of the whole process. A good plan will identify a realistic objective for the benchmarking study, which is achievable and clearly aligned with business priorities.
- A prerequisite for benchmarking success is to understand thoroughly your own processes. Without this it is difficult to compare your processes against those of other companies.
- Look at what is already available. A lot of information is already in the public domain. Published accounts, journals, conferences and professional associations can all provide information which is useful for benchmarking purposes.
- Be sensitive in asking for information from other companies. The golden rule is: 'Don't ask any questions that we would not like to be asked ourselves.'

10.12 Summary

- Learning can be from both internal and external sources.
- Xerox was the first organization which initiated benchmarking concept and it went on win Malcolm Baldrige National Quality Award.
- Benchmarking is a continuous, systematic process of evaluating and comparing the capability of one organization with others normally recognized as industry leaders, for insights for optimizing the organizations processes.
- Strategic Benchmarking must begin with the assessment of the needs and expectations of the customer.
- Strategic benchmarking deals with to management and looks at what strategies the organizations are using to make them successful.
- Operational Benchmarking is assessing and implementing the best practices of industry or public service leaders to improve processes to the extent possible to meet organizational goals.
- Performance benchmarking is an important technique secures external involved in the processes or feedback to the concerned persons involved in the processes or activities.
- In 2008, a comprehensive survey on benchmarking was commissioned by The Global Benchmarking Network, a network of benchmarking centers representing 22 countries. Over 450 organizations responded from over 40 countries.
- There is no specific procedure for benchmarking and organizations can design their own method of benchmarking and hence it may vary from organization to organization.

Notes

- Every organization which would like to benchmark must have clear knowledge about its own processes, products and services before it can compare itself with another organization.
- The pioneer of Benchmarking Robert Camp lists the benchmarking process in five phases. These five phases are: planning, analysis, integration, action and maturity.
- Two-tune, Baldrige Award winning AT&T, an active bench-marker, has developed a nine-step model.
- The two most common forms of quantitative analysis used in metric benchmarking are Data Envelope Analysis (DEA) and regression analysis.
- Regression analysis estimates what the average firm should be able to achieve.
- Benchmarking helps organizations to determine areas for future improvement to remain competitive in the market.
- Competitive analysis is an approach to goal setting used by many firms. This approach is essentially benchmarking confined to one's own industry.

10.13 Keywords

Benchmarking: A surveyor's mark on a permanent object of predetermined position and elevation used as a reference point.

Cause-effect Diagrams: The diagram illustrates the main causes and sub-causes leading to an effect (symptom). The cause-effect diagram is one of the seven quality tools of TQM.

Competitive Benchmarking: It is a process whereby businesses use primary data about their competitive set and industry best practices to pin down several core dimensions of success.

Core Competencies: A competency which is made necessary by the strategy of an organization and is central to the making of that strategy.

Operational Benchmarking: Operational benchmarking allows organisations to evaluate various aspects of their operations and compare them to industry standards.

Process Benchmarking: It is where a specific process is measured and compared against similar processes of the organisation known to be the best for that specific process.

Product Benchmarking: The process of designing new products or upgrades to current ones. This process can sometimes involve reverse engineering which is taking apart competitors products to find strengths and weaknesses.

Self Analysis: A careful, thorough, and insightful analysis of self an applicant conducts prior to taking part in interviews.

Strategic Benchmarking: It involves observing how others compete. This type is usually not industry specific meaning it is best to look at other industries.

SWOT Analysis: A study undertaken by an organization to identify its internal strengths and weaknesses, as well as its external opportunities and threats

Technology Portfolio: a collection of observational notes, results from assessment instruments, and copies of children's creations in an authoring software program, such as HyperStudio.

Value analysis: The systematic and critical assessment by an organization of every feature of a product to ensure that its cost is no greater than is necessary to carry out its functions.

Notes

10.14 Review Questions

1. Define benchmarking.
2. What are the two levels of benchmarking? Differentiate between them.
3. Explain the different types of benchmarking.
4. Discuss the benefits of benchmarking.
5. Explain the complete procedure of benchmarking.
6. Briefly explain the Xerox 12 step process.
7. What are the various types of cost of benchmarking?
8. What do you understand by technical/ product benchmarking?
9. Explain metric benchmarking.
10. Explain the implementation and reasons for benchmarking.

Answers: Self Assessment

1. Xerox
2. Benchmarking
3. Benchmarking
4. Strategic
5. Corporate
6. Operational
7. Competitive
8. Strategic benchmarking
9. Generic
10. External benchmarking
11. Competing
12. Improvement
13. Benchmarking
14. Self analysis
15. Planning
16. Type
17. Performance gaps
18. Reduced
19. Technical
20. Metric
21. Data Envelope
22. Regression

Notes

23. Continuous
24. Benchmarking
25. Planning
26. Action
27. Benchmarking
28. Competitive

10.15 Further Readings

Books

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Charantimath M. Poornima (2009). *Total Quality Management*. Pearson Education.

Mukherjee N. P. (2006). *Total Quality Management.* PHI Learning Pvt. Ltd.

Nigam Shailendra (2009). *Total Quality Management.* Excel Books.

Online links

http://bmdynamics.com/issue_pdf/bmd110186__34_44.pdf

http://www.scribd.com/doc/24932697/Bench-Marking-in-TQM

http://www.blurtit.com/q386762.html

http://www.productivity.in/knowledgebase/General/Bench%20Marking/Introduction%20to%20Bench%20Marking.pdf

Notes

Unit 11: Environmental Management Systems

CONTENTS

Objectives

Introduction

11.1 Environmental Management Systems: An Introduction

11.2 Benefits of EMS

11.3 ISO 9000

11.3.1 ISO Standard Series and Some Other Standards

11.3.2 ISO 9000 Quality System Certification

11.3.3 Benefits of ISO Certification

11.3.4 Limitation of ISO 9000 Certification

11.4 ISO 14000

11.4.1 ISO 14000 Series Standards

11.5 Requirements of ISO 14001

11.5.1 General Requirement

11.5.2 EMS Audit

11.6 Summary

11.7 Keywords

11.8 Review Questions

11.9 Further Readings

Objectives

After studying this unit, you will be able to:

- Define Environmental management systems and ISO
- Discuss the benefits of EMS
- Explain ISO 9000 and ISO 14000
- Explain the requirements of ISO 14001

Introduction

Previous unit gave you an insight on the concept of benchmarking, the various types of benchmarking and their levels. It also talked about the process, reasons and benefits of benchmarking.

In this unit, you will study about ISO 9000 Quality Standard and ISO certifications. In this unit you will also learn about the documentation of quality systems and implementation of ISO 9001:2000.

Quality is the basic requirement for business success and the survival of any business organization will depend on its ability meet or exceed both stated and implied expectations of the customers.

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Thus quality management has emerged as the most important strategic function for all business organizations. This resulted in the development of various standards and guidelines. In order to fulfill customer needs and expectations, all world class organizations create quality systems. This led to the concept of "Quality Management Systems" which is popularly known as QMS. A Quality Management System is the system which provides guidelines for the organization and its employees to identify the needs of customer and to design, develop, produce and deliver the products or services to meet these needs. Thus quality management systems ensure that an organization's efforts are directed towards achievement of high quality of products and services.

11.1 Environmental Management Systems: An Introduction

Environmental management standards exist to help organizations minimize how their operations negatively affect the environment (cause adverse changes to air, water, or land), comply with applicable laws and regulations). It can be defined as a system of procedures, training, and methods to monitor an organization's impact on the environment and evaluate ways to minimize negative impacts on the environment.

The International Organization for Standards (ISO) completed the Quality Management System (ISO 9000) in 1987. Its worldwide success, along with increased emphasis on environmental issues, was instrumental in ISO's decision to develop environmental management standards. In 1991, ISO formed the Strategic Advisory Group on the Environment (SAGE), which led to the formation of Technical Committee (TC) 207 in 1992.

Self Assessment

Fill in the blanks:

1. A ……. is the system which provides guidelines for the organization and its employees to identify the needs of customer and to design, develop, produce, deliver the products or services to meet these needs.
2. Quality management systems ensure that an organization's efforts are directed towards achievement of …….. of products and services.
3. Environmental management standards exist to help organizations ……. how their operations negatively affect the environment.
4. The international organization for standards (ISO) completed the quality management system in……. .

11.2 Benefits of EMS

Implementing EMS has several benefits and these benefits are spread to the organizations as well to the society. These benefits are not limited to a country and they are called as global benefits.

Global benefits include improved trade across the borders and removal of trade barriers, better planet earth with improved environmental performance, and increased stress on need to manage environment by reducing negative effects of pollution.

Organizations implementing ISO 14000 can reap several benefits can some of them are:

- Assuring customers about environmental commitment of the organization
- Maintaining good public image and relations
- Increased brand image and market share

Notes

- Competitive advantage
- Conservation of scarce resources
- More exports
- No legal harassments
- Increased compliance to statutory requirements
- Protection to human health
- Cost effectiveness

11.3 ISO 9000

ISO 9000 is a series of standards dealing with quality management systems. The standards are published by the International Organization. All industrialized countries are members and participate in writing the standards.

Most countries have adopted and published ISO 9000 as their own national standard. In the United States, it has been issued as Q9000 with virtually the same text as the original standard.

Did u know? ISO 9000 was first published in 1987 and has undergone several revisions since its inception.

11.3.1 ISO Standard Series and Some Other Standards

The ISO Standard Series includes the following Systems Standards indicating their specific purposes:

- ***ISO 9000:*** Quality Management and Quality Assurance Standards Guidelines for Selection and Use
- ***ISO 9001:*** Model for Quality Assurance in Design/Development, Production Installation, and Servicing.
- ***ISO 9002:*** Model for Quality Assurance in Production and Installation.
- ***ISO 9003:*** Model for Quality Assurance in Final Inspection and Test.
- ***ISO 9004:*** Generic Guidelines for Quality Management and Systems.
- ***ISO 9004-2:*** Guidelines for Services
- ***ISO 14001:*** Environmental Management System Guidelines for Principles, Systems, and Supporting Techniques.

Some other System Standards include:

- ***QS 9000:*** Encompasses ISO 9000 and the Big Three Auto Makers specific requirements.
- ***TS 9000:*** Based on ISO 9001 establishes quality systems requirements for the worldwide telecommunications network.
- ***FDA-CGMP:*** Medical Device, Current Good Manufacturing Practices (includes all of ISO 9001).

Notes

11.3.2 ISO 9000 Quality System Certification

Initially ISO 9000 was used as the basis for specifying quality requirements in contractual arrangements between a purchaser and supplier. Customers would perform on-site assessments of their suppliers to ensure compliance.

Third-party "registrars" are now being used to perform independent ISO 9000 assessments. These certifying bodies are officially authorized by a national accreditation group to carry out the audits and issue certificates. Registrars certify to customers that a supplier is complying with all the applicable requirements of the standard.

11.3.3 Benefits of ISO Certification

Some basic benefits of ISO 9000 Certification are summarized below:

- Improved customer satisfaction
- Greater quality awareness
- Higher real and perceived quality
- Positive cultural change
- Competitive edge
- Increased market share
- Increased productivity
- Reduced costs.

11.3.4 Limitation of ISO 9000 Certification

Though ISO 9000 has proved to be very effective for software development organizations, however, it also suffers from several limitations.

- ISO 9000 does not automatically lead to Total Quality Management (TQM), i.e., continuous improvement.
- ISO 9000 does not provide any guideline for defining an appropriate process.
- ISO 9000 certification process is not foolproof and thus variations in the certification norms may exist.

Self Assessment

Fill in the blanks:

5. ……. benefits include improved trade across the borders and removal of trade barriers, better planet earth with improved environmental performance, and increased stress on need to manage environment by reducing negative effects of pollution.
6. ISO 9000 is a series of standards dealing with …… management systems.
7. Customers would perform on-site assessments of their suppliers to ensure…….. .
8. ……. certify to customers that a supplier is complying with all the applicable requirements of the standard.

Notes

Caselet

Environmental Management for Construction of Roads, Bridges and Marine

In order to meet Transport SA's environmental commitments, the Agency developed a comprehensive, integrated system of environmental management for the construction phase of road, bridge and marine facilities. The management system is documented in a suite of guideline documents together with a code of practice, master specification requirements and pre-qualification criteria. To assist in the understanding and adoption of the system a training program was undertaken by Transport SA staff and project contractors. Whilst too early to fully quantify the benefits of the system, immediate improvements have been made and it is expected that these benefits will continue to flow.

The development of the integrated environmental management system undertaken by Transport SA included consultation with internal and external stakeholders. This was critical since the intended outcome was a system that contractors could easily apply on site. The integrated environmental management system has been applied to a number of projects which has led to a number of key learning points and improvements.

Previously, most of the responsibility for complying with environmental requirements was placed on contractors. The new approach includes a shared responsibility whereby contractors and Transport SA share the duty of care to prevent and minimise environmental harm.

Within the integrated environmental management system compliance is seen as a minimum requirement. Integrating environmental management into project delivery will assist with continuous improvement across all phases of project delivery.

The effectiveness of the management system is continually improved through periodic reviews and a feedback loop which ensures that on-site experience is fed back into the planning phase. This ensures that the system complies with changing legislation and community expectations.

11.4 ISO 14000

ISO 14001 is the international specification for an Environmental Management System (EMS). It specifies requirements for establishing an environmental policy, determining environmental aspects and impacts of products/activities/services, planning environmental objectives and measurable targets, implementation and operation of programs to meet objectives and targets, checking and corrective action, and management review.

ISO 14000 is similar to ISO 9000 quality management in that both pertain to the process (the comprehensive outcome of how a product is produced) rather than to the product itself. The overall idea is to establish an organized approach to systematically reduce the impact of the environmental aspects which an organization can control. Effective tools for the analysis of environmental aspects of an organization and for the generation of options for improvement are provided by the concept of Cleaner Production.

11.4.1 ISO 14000 Series Standards

The material included in this family of specifications is very broad. The major parts of ISO 14000 are:

- ISO 14001 is the standard against which organizations are assessed. ISO 14001 is generic and flexible enough to apply to any organization producing and/or manufacturing any product, or even providing a service anywhere in the world.

Notes

- ISO 14004 is a guidance document that explains the 14001 requirements in more detail. These present a structured approach to setting environmental objectives and targets and to establishing and monitoring operational controls.
- These are further expanded upon by the following:
  - ISO 14020 series (14020 to 14025), Environmental Labeling, covers labels and declarations.
  - ISO 14030 discusses post-production environmental assessment.
  - ISO 14031 Evaluation of Environmental Performance.
  - ISO 14040 series (14040 to 14044), Life Cycle Assessment, LCA, discusses pre-production planning and environment goal setting.
  - ISO 14050 terms and definitions.
  - ISO 14062 discusses making improvements to environmental impact goals.
  - ISO 14063 is an addendum to 14020, discussing further communications on environmental impact.
  - ISO 14064-1: 2006 is Greenhouse gases – Part 1: Specification with guidance at the organization level for the description, quantification and reporting of greenhouse gas emissions and removals.
  - ISO 14064-2: 2006 is Greenhouse gases – Part 2: Specification with guidance at the project level for the description, quantification, monitoring and reporting of greenhouse gas emission reductions and removal enhancements.
  - ISO 14064-3: 2006 is Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertion.
  - ISO 19011 which specifies one audit protocol for both 14000 and 9000 series standards together. This replaces ISO 14011 meta-evaluation—how to tell if your intended regulatory tools worked. 19011 is now the only recommended way to determine this.

Self Assessment

Fill in the blanks:

9. ISO 14001 is the international specification for an …… Management System.
10. Effective tools for the analysis of environmental aspects of an organization and for the generation of options for improvement are provided by the concept of…… .
11. ISO 14004 is a …….. document that explains the 14001 requirements in more detail.
12. ISO ……. discusses making improvements to environmental impact goals.

Task Present an article on the procedures involved in the implementation of ISO 14000 standards.

11.5 Requirements of ISO 14001

In order to effectively implement and benefit from an ISO 14001 EMS, it is important to have an understanding of the standard's requirements. A quick review of the standard shows that it is

Notes

structured following the Plan, Do, Check, Improve philosophy of the Total Quality Management movement, as follows:

11.5.1 General Requirement

PLAN

1. Policies
2. Planning

DO

3. Implementation and Operation

CHECK

4. Checking and Corrective Action

IMPROVE

5. Management Review

Within these elements are 17 sub-elements stating the various requirements.

Important elements are explained below:

Policies

ISO 14001 requires that the organization have a policy statement to drive the EMS.

These tend to be short, one page or fewer documents, and simply affirm the commitments. There is no expectation that specific details be noted in the policy.

Example: The commitment to pollution prevention can simply be stated saying, "we are committed to prevention of pollution".

The policy must be clearly endorsed by top management and be available to the public and employees. Although the availability to the public can be rather passive; i.e. "is here if they want it", there is an expectation that the employee awareness is more proactive. Section 4.2 of ISO 14001 lists the other requirements of the policy.

Planning

1. ***Environmental Aspects:*** This element requires a procedure that not only identifies the aspects and impacts, but also provides for determination of significance, and keeping the information up to date.

   Caution ISO 14001 does not prescribe what aspects should be significant, or even how to determine significance.

   However, it is expected the organization will develop a consistent and verifiable process to do so.

2. ***Legal and Other Requirements:*** This is a requirement for a procedure that explains how the organization obtains information regarding its legal and other requirements, and makes that information known to key functions. This is not the assessment or compliance audit requirement, but rather a more up front determination of requirements.

Notes

3. ***Objectives and Targets:*** There is no requirement for a procedure in this element, only that objectives and targets be documented. It does require that certain items be considered in developing the objectives, such as legal requirements and prevention of pollution. It is sometimes easiest to develop a procedure anyway for this element to be able to verify these considerations were made.

4. ***Environmental Management Programs (EMP):*** EMPs are the detailed plans and programs explaining how the objectives and targets will be accomplished. These EMPs usually note responsible personnel, milestones and dates, and measurements of success.

Implementation and Operation

1. ***Structure and Responsibility:*** ISO 14001 requires that the relevant management and accountability structure be defined in this element. This usually takes the form of an organizational chart.

Notes The organization must denote the management representative who is responsible to oversee the EMS and report to management on its operation.

2. ***Training Awareness and Competence:*** The key point in this element is that personnel must receive applicable training regarding the EMS. Specific requirements are itemized in ISO 14001, and include general, company-wide items such as knowing the policy, to more function-specific training on aspects and emergency response. An organization usually responds to this element with a training matrix, cross-referencing to training materials and records.

3. ***Communications:*** Procedures are required for both internal and external communications. Note that ISO 14001 only requires procedures, and allows the organization to decide for itself the degree of openness and disclosure of information. Whatever the decision is taken in terms of disclosure, that decision process must be recorded.

4. ***EMS Documentation:*** This requirement is simply that the organization has documented the system in either electronic or paper form such that it addresses the elements of the standard and provides direction to related documentation. Not all ISO 14001 required procedures need to be documented, as long as the system requirements can be verified.

5. ***Document Control:*** Procedures are required to control documents, such as system procedures and work instructions, and to ensure that current versions are distributed and obsolete versions are removed from the system.

6. ***Operations Control:*** This element is the one which connects the EMS with the organization as a whole. Here, the critical functions related to significant aspects and objectives and targets are identified and procedures and work instructions created to ensure proper execution of activities. Requirements for communicating applicable system requirements to contractors are also addressed.

7. ***Emergency Planning and Response:*** Although typically addressed through conventional emergency response plans, this element also requires that a process exist for identifying the potential emergencies, in addition to planning and mitigating them. A linkage to the aspects analysis, where impacts are assessed, is appropriate. Emergency incidents include those that may not be regulated, but may still cause significant impact as defined by the organization.

Notes

Checking and Corrective Action

1. ***Monitoring and Measurement:*** Procedures are required describing how the organization will monitor and measure key parameters of operations. These parameters relate to the significant aspects, objectives and targets and legal and regulatory compliance.

> *Notes* In order to properly manage the system, measurements must be taken of its performance to provide data for action.

   Responses to this element usually cross reference to many other specific procedures and work instructions describing measurement and equipment calibration. It is in this element that we find the requirement for what is commonly referred to as a compliance audit.

2. ***Non-conformance, Corrective, and Preventive Action:*** This element requires procedures for acting on non-conformances identified in the system, including corrective and preventive action. Non-conformances may be identified through audits, monitoring and measurement, and communications. The intent is to correct the system flaws. Typically, Corrective Action Report (CAR) forms are the norm, noting the non conformance, the suggested fix, and closure of the action when completed. Note that this requirement does not imply in any way that the party identifying the non conformance must be the one to suggest the fix. Instead, it is expected that the system provide for the information to be routed to the most appropriate party to address the concern.

3. ***Records:*** Records are expected to exist to serve as verification of the system operating.

   Example: Records include audit reports and training records.

   Unlike controlled documents, records are "once and done" documents, resulting from the execution of some process or procedure. Procedures in this element are required for the maintenance of records.

4. ***EMS Audit:*** ISO 14001 requires that the system provide for internal audits. These procedures will include methodologies, schedules, and processes to conduct the audits. Interestingly, the EMS audit will in essence, audit the audit process itself.

Management Review

This element requires that periodically, top management will review the EMS to ensure it is operating as planned. If not, resources must be provided for corrective action. For areas where there are no problems, the expectation is that with time, management will provide for improvement programs. Usually there is no detailed procedure for this element, although records of agendas, attendance, and agreed upon action items are maintained as verification.

Integrating ISO 14000 and ISO 9000

Implementing ISO 14000 requires huge efforts and it can consume lot of time for an organization. But organizations which have successfully implemented ISO 9000 previously may find it easy and this is due to the fact that many requirements for ISO 14000 would have already in place. Hence it is always advisable for the organizations to integrate their EMS with ISO 9000. This reduces increased need for documentation and also reduces the total cost of implementation.

Notes

Relationship with Health and Safety

ISO 14000 is an environmental management system which aims at improving environmental management system and it results in improved work environment. Improved work environment will always results increased health and safety to the employees.

11.5.2 EMS Audit

The purpose of this audit is to ensure that the EMS conforms to plans and is being properly implemented and maintained.

Caution Internal or self audit and external audit information should be distributed to senior management to assist in the management review process.

Audit procedures should cover the scope, frequency and methodologies, and responsibilities and requirements for conducting audits and reporting results. The audit schedule should be based on the importance of the element and the results of previous audits.

Self Assessment

Fill in the blanks:

13. A quick review of the standard shows that it is following the ……. philosophy of the Total Quality Management.
14. ISO 14001 requires that the organization have a policy statement to drive the……. .
15. ……. requires a procedure that not only identifies the aspects and impacts, but also provides for determination of significance, and keeping the information up to date.
16. ……. are the detailed plans and programs explaining how the objectives and targets will be accomplished.
17. …… connects the EMS with the organization as a whole.
18. …….. are expected to exist to serve as verification of the system operating.
19. The purpose of ……. is to ensure that the EMS conforms to plans and is being properly implemented and maintained.

Case Study

ISO 9000 Certificate for GMCH 32 Likely

India is emerging as an important global destination for affordable medical services or medical tourism, as it is termed, for both developed and developing countries. The reason is that it is the least expensive, as far as hotel accommodation, transport and medical treatment are concerned.

It is, therefore, being considered mandatory for all medical service providers to demonstrate their commitment to quality of services at the international level. Whereas many private hospitals already hold the ISO 9000 certification, the Government Medical College and Hospital, Sector 32, will most probably be the first government institution of its kind in

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north India to obtain it. Dr V.K. Kak, Director Principal, GMCH, says, "The hospital fulfils most of the conditions for getting the certification. Therefore, we are formally going ahead with the process."

The recent two-day exposition on "Healthcare in the new millennium" which concluded at the Indian Medical Association (IMA) complex, had deliberation mainly on ISO 9000 certification. The workshop, which was organised by the local branch of the IMA in association with Ind Medica. Com. concentrated on creating awareness about various aspects to meet the international standards of healthcare.

According to M.B. Mittal, Joint Director, Indian Institute of Quality Management (IIQM), the future will see a variety of changes in health-insurance, besides. medico-legal aspects in India. "Healthcare practitioners at all levels will have to be well-versed with these changing aspects and plan accordingly," he said. Besides, with increasing medico-legal aspects, insurance companies in the future will prefer a patient to receive treatment in a certified hospital.

International Organisation of Standardisation or ISO 9000 is a family of standards and quality assurances. Presently, three standards for certification exist which includes 9001, 9002 and 9003. These are generic standards which can be applied to any industry. IIQM is the only institute set up by the Ministry of Information Technology, which is providing ISO certification for medical treatment programmes.

Mittal added that standardisation gains importance because India is fast becoming a global centre for medical treatment. "The treatment here is reasonably cheap and the waiting list almost non-existing."

Moreover, with the added aspect of the medico-Legal Insurance, ISO stands to gain specific significance. According to Dr G.S. Kochchar, President of the IMA internationally there is a need to better and sustain our capabilities and facilities. "In fact, ISO 9000 is not only for super specialities but can also be given to small nursing homes and laboratories."

ISO 9000 gains significance because, as of now, India doesn't have a hospital accreditation system. "Abroad, hospitals are given certificates like hotels, depending upon the facilities and services offered," says Mittal. ISO 9000 is globally accepted and recognised standard for quality.

With the certification, both the patients and doctors stand to gain, says Dr A.K Atri, Reader, Department of Surgery GMCH, "Patients will be benefited by quality healthcare service at economised cost and hospitals can concentrate on providing assured quality service."

He added that GMCH had thought of obtaining quality services assurance considering that it fulfills all the requirements set by IIQM. "The quality certification will be renewed every three years. Moreover, the supervising force within the area will ensure that once it gets a certificate it is maintained, as ISO also has an inbuilt capacity for verification."

Besides, there are inbuilt provisions for training doctors and paramedics, which further enhance the capabilities of an institute. "The component therapy unit established recently at GMCH provides an excellent example as to how blood can be conserved ensuring qualitative economy in blood," emphasizes Dr J.G. Jolly, Emiretus Professor.

"This is being done as per directives of the World Health Organisation which gave the call for providing safe blood together with extending the programme in such a manner that the patient gets maximum benefits. This is all result of quality control," he adds.

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"Considering the fact that state-of-the-art GMCH already fulfills most of the requirements for getting the certificate, the Director of the IIQM, Mr G. Giani has assured that we might get it within the next six months," said Dr Atri.

Questions

1. Do you think ISO 9000 is needed for healthcare services? If so, why?
2. What are the advantages of obtaining ISO 9000 for GMCH 32?
3. With ISO 9000 certification, both the patients and doctors stand to gain, says Dr A.K. Atri, Reader, Department of Surgery GMCH "Patients will be benefited by quality healthcare service at economised cost and hospitals can concentrate on providing assured quality service." Justify this statement.
4. "The quality certification will be renewed every three years. Moreover, the supervising force within the area will ensure that once it gets a certificate it is maintained, as ISO also has an inbuilt capacity for verification." Do you agree with the statement that ISO has inbuilt verification? Discuss.

Source: Chandigarh Tribune, September 18, 2000

11.6 Summary

- Quality is the basic requirement for business success and the survival of any business organization will depend on its ability meet or exceed both stated and implied expectations of the customers.
- A Quality Management System is the system which provides guidelines for the organization and its employees to identify the needs of customer and to design, develop, produce, deliver the products or services to meet these needs.
- Environmental management standards can be defined as a system of procedures, training, and methods to monitor an organization's impact on the environment and evaluate ways to minimize negative impacts on the environment.
- Implementing EMS has several benefits and these benefits are spread to the organizations as well to the society. These benefits are not limited to a country and they are called as global benefits.
- ISO 9000 is a series of standards dealing with quality management systems. The standards are published by the International Organization.
- Initially ISO 9000 was used as the basis for specifying quality requirements in contractual arrangements between a purchaser and supplier. Customers would perform on-site assessments of their suppliers to ensure compliance.
- Though ISO 9000 has proved to be very effective for software development organizations, however, it also suffers from several limitations.
- ISO 14001 specifies requirements for establishing an environmental policy, determining environmental aspects and impacts of products/activities/services, planning environmental objectives and measurable targets, implementation and operation of programs to meet objectives and targets, checking and corrective action, and management review.
- In order to effectively implement and benefit from an ISO 14001 EMS, it is important to have an understanding of the standard's requirements.

Notes

- Environmental Management Programs are the detailed plans and programs explaining how the objectives and targets will be accomplished.
- Implementing ISO 14000 requires huge efforts and it can consume lot of time for an organization. But organizations which have successfully implemented ISO 9000 previously may find it easy and this is due to the fact that many requirements for ISO 14000 would have already in place.
- The purpose of EMS audit is to ensure that the EMS conforms to plans and is being properly implemented and maintained.

11.7 Keywords

Cleaner Production: It is the continual effort to prevent pollution, reduce the use of energy, water and material resources and minimize waste, all without reducing production capacity.

Competitive Advantage: A situation in which one country, region, or producer can produce a particular commodity more cheaply than another country, region or producer.

Continuous Improvement: A philosophy of making frequent and small changes to production processes; the cumulative results of which lead to high levels of quality and efficiency.

Cost Effectiveness: When the money saved by renewable energy and energy efficiency more than pay for the capital and maintenance costs over a given period .

EMS Documentation: Policies and procedures relating to the management of EMS related documents. These documents include, but are not limited to, the EMS Manual, EMS Policies and Procedures, and Operational Procedures.

Environmental Management System: A defined system of procedures, training, and methods to monitor an organization's impact on the environment and evaluate ways to minimize negative impacts on the environment.

International Organization for Standards: International Organization for Standardization, is a nonprofit organization that develops and publishes standards of virtually every possible sort, ranging from standards for information technology to fluid dynamics and nuclear energy.

ISO 14001: ISO 14001 sets out the criteria for an environmental management system.

ISO 9000: ISO 9000 is a family of standards for quality management systems. ISO 9000 is maintained by ISO, the International Organization for Standardization and is administered by accreditation and certification bodies.

Quality Management Systems: A Quality Management System provides a management framework that gives you the necessary controls to address risks and monitor and measure performance in your business.

11.8 Review Questions

1. Briefly explain the concept of environmental management systems.
2. What are the benefits of EMS?
3. Explain ISO 9000 standard and some of its standard series.
4. What are the benefits and limitations of ISO certification to the companies?
5. Briefly discuss ISO 14000. What are its similarities with ISO 9000?
6. What are the requirements for ISO 14001 certification?

Notes

7. Write a short note on the development and broader aspect of ISO 14000.
8. What are the various checking and corrective actions taken in the context of ISO 14000?
9. Write a brief description on EMS audit.
10. Write a short note on:
    (a) PDCA philosophy in ISO 14001.
    (b) Various aspects of planning.
    (c) EMS documentation.
    (d) Management review.

Answers: Self Assessment

1.	Quality Management System	2.	High quality
3.	Minimize	4.	1987
5.	Global	6.	Quality
7.	Compliance	8.	Registrars
9.	Environmental	10.	Cleaner Production
11.	Guidance	12.	14062
13.	PDCA	14.	EMS
15.	Environmental Aspects	16.	Environmental Management Programs
17.	Emergency Planning and Response	18.	Records
19.	EMS audit		

11.9 Further Readings

Books

Besterfield Dale H. (2011). *Total Quality Management*. Pearson Education.

Charantimath M. Poornima (2009). *Total Quality Management*. Pearson Education.

Mukherjee N. P. (2006). *Total Quality Management.* PHI Learning Pvt. Ltd.

Nigam Shailendra (2009). *Total Quality Management.* Excel Books.

Online links

http://www.gov.ns.ca/nse/pollutionprevention/docs/EMS_factsheet.pdf

http://www.ellipson.com/files/ebooks/ISO14000.pdf

http://www.iso.org/iso/home/standards/management-standards/iso14000.htm

http://www.iso14000-iso14001-environmental-management.com/

Notes

Unit 12: Quality Function Deployment

CONTENTS

Objectives

Introduction

12.1 Development of Quality Function Deployment

12.2 Meaning of Quality Function Deployment

12.3 QFD Team

12.3.1 Benefits of QFD

12.4 Voice of the Customer

12.5 Organization of Information

12.5.1 Building House of Quality

12.6 QFD Process

12.7 Reliability

12.7.1 Reliability Requirements

12.8 Failure Rate

12.9 Summary

12.10 Keywords

12.11 Review Questions

12.12 Further Readings

Objectives

After studying this unit, you will be able to:

- Define quality function deployment
- Discuss the development of quality function deployment
- Explain the benefits of quality function deployment
- Explain organization of information and house of quality
- Elaborate the QFD process

Introduction

Previous unit gave you an insight on EMS and ISO 9000 and 14000 standards. This unit will help you learn about the quality function Deployment, its processes and benefits.

Quality Function Development is a scientific technique for translating the voice of the customer into the development of products and services. It is a complete product planning process as opposed to problem solving and analysis.

Notes

12.1 Development of Quality Function Deployment

QFD was developed in Japan in the late 1960s by Professors Shigeru Mizuno and Yoji Akao. At the time, statistical quality control, which was introduced after World War II, had taken roots in the Japanese manufacturing industry, and the quality activities were being integrated with the teachings of such notable scholars as Dr. Juran, Dr. Kaoru Ishikawa, and Dr. Feigenbaum that emphasized the importance of making quality control a part of business management, which eventually became known as TQC and TQM.

Did u know? The technique of QFD was invented by Akashi Fukuhara of Japan and first applied with very good results at Toyota.

The purpose of Professors Mizuno and Akao was to develop a quality assurance method that would design customer satisfaction into a product before it was manufacturer. Prior quality control methods were primarily aimed at fixing a problem during or after manufacturing.

The first large scale application was presented in 1966 by Kiyotaka Oshiumi of Bridgestone Tire in Japan, which used a process assurance items fishbone diagram to identify each customer requirement (effect) and to identify the design substitute quality characteristics and process factors (causes) needed to control and measure it.

In 1972, with the application of QFD to the design of an oil tanker at the Kobe Shipyards of Mitsubishi Heavy Industry, the fishbone diagrams grew unwieldy. Since the effects shared multiple causes, the fishbone could be refashioned into a spreadsheet or matrix format with the rows being desired effects of customer satisfaction and the columns being the controlling and measurable causes.

At the same time, Katsuyoshi Ishihara introduced the Value Engineering principles used to describe how a product and its components work. He expanded this to describe business functions necessary to assure quality of the design process itself.

Merged with these new ideas, QFD eventually became the comprehensive quality design system for both product and business process.

Today, QFD continues to inspire strong interest around the world, generating ever new applications, practitioners and researchers each year. Countries that have held national and international QFD Symposium to this day include the U.S., Japan, Sweden, Germany, Australia, Brazil, and Turkey.

12.2 Meaning of Quality Function Deployment

"Time was when a man could order a pair of shoes directly from the cobbler. By measuring the foot himself and personally handling all aspects of manufacturing, the cobbler could assure the customer would be satisfied," lamented Dr. Yoji Akao, one of the founders of QFD, in his private lectures.

Quality Function Deployment (QFD) was developed to bring this personal interface to modern manufacturing and business. In today's industrial society, where the growing distance between producers and users is a concern, QFD links the needs of the customer (end-user) with design, development, engineering, manufacturing, and service functions.

QFD is:

1. Understanding Customer Requirements
2. Quality Systems Thinking + Psychology + Knowledge/Epistemology

Notes

3. Maximizing Positive Quality that Adds Value
4. Comprehensive Quality System for Customer Satisfaction
5. Strategy to Stay Ahead of the Game

As a quality system that implements elements of Systems Thinking with elements of Psychology and Epistemology (knowledge), QFD provides a system of comprehensive development process for:

- Understanding customer needs
- What 'value' means to the customer
- Understanding how customers or end users become interested, choose, and are satisfied
- Analyzing how do we know the needs of the customer
- Deciding what features to include
- Determining what level of performance to deliver
- Intelligently linking the needs of the customer with design, development, engineering, manufacturing, and service functions
- Intelligently linking Design for Six Sigma (DFSS) with the front end Voice of Customer analysis and the entire design system

QFD is a comprehensive quality system that systematically links the needs of the customer with various business functions and organizational processes, such as marketing, design, quality, production, manufacturing, sales, etc., aligning the entire company toward achieving a common goal.

It does so by seeking both spoken and unspoken needs, identifying positive quality and business opportunities, and translating these into actions and designs by using transparent analytic and prioritization methods, empowering organizations to exceed normal expectations and provide a level of unanticipated excitement that generates value.

The QFD methodology can be used for both tangible products and non-tangible services, including manufactured goods, service industry, software products, IT projects, business process development, government, healthcare, environmental initiatives, and many other applications.

Self Assessment

Fill in the blanks:

1. ……. is a scientific technique for translating the voice of the customer into the development of products and services.
2. The first large scale application was presented in 1966 by Kiyotaka Oshiumi of …….. in Japan.
3. …….. links the needs of the customer with design, development, engineering, manufacturing, and service functions.

12.3 QFD Team

The success of QFD in any organization depend on the team involved in QFD process and it requires commitment from project and team members and also significant amount of efforts are needed from each one of the team members.

Notes

Notes Top management must be clearly communicating priorities of projects so that teams can plan accordingly. The project should be clear about scope of the project and role of project team members.

Two types of teams are used in QFD projects. They teams for designing a new product or teams for improving the existing products. QFD needs cross functional teams as it requires multiple skills. Normally QFD teams may contain employees from various functional areas like marketing, design, quality, finance and production. Effective time utilization is key for success for QFD teams.

Notes Teams must prepare a project schedule so that activities are carried as per schedule.

Inter team communication also plays an important role in ensuring that con dysfunctional conflicts exists between team members.

QFD teams must ensure that they meet regularly and it is duty of the team leader to ensure that meetings are effectively held and all members are kept informed about the meetings. Meetings must have clear agenda related to improvement projects and all members shall be able to contribute to the improvement projects.

12.3.1 Benefits of QFD

- Focus on customer
  - Focuses mainly on customer needs
  - Compare their product with competitors
  - Prioritize according to customer's level of importance
  - Identify the vital items to be acted upon
- Time savings
  - Enables to change the design in the starting itself
  - Limits the problems after introduction of the product
  - Reduces the time for redesigning since all changes are made in the first step itself
- Team work
  - Based on every one's ideas
  - Creates good communication flow
  - Identifies team work and recognition to each team member
- QFD minimizes the later engineering changes and results in better quality because the clearer product definition helps in better product development cycle.
- The analytic vigor of QFD causes streamlining of processes and helps in elimination of many internal processes that do not add value to the new product development process.
- QFD through documentation helps in building product development intelligence, preventing recurrence of errors, helping new engineers to learn processes faster without assistance of senior managers and engineers.

Notes

Self Assessment

Fill in the blanks:

4. …… must be clearly communicating priorities of projects so that teams can plan accordingly.
5. Effective ……. is key for success for QFD teams.
6. The ……. vigor of QFD causes streamlining of processes and helps in elimination of many internal processes that do not add value to the new product development process.

12.4 Voice of the Customer

The "voice of the customer" is a process used to capture the requirements/feedback from the customer (internal or external) to provide the customers with the best in class service/product quality. This process is all about being proactive and constantly innovative to capture the changing requirements of the customer along with time and as per changing tastes.

The "voice of the customer" is the term used to describe the stated and unstated needs or requirements of the customer. The voice of the customer can be captured in a variety of ways: Direct discussion or interviews, surveys, focus groups, customer specifications, observation, warranty data, field reports, complaint logs, and other various sources which can get significant information. .

This data is used to identify the quality attributes needed for a supplied component or material to incorporate in the process or product.

There is no one monolithic voice of the customer. Customer voices are diverse. In consumer markets, there are a variety of different needs. Even within one buying unit, there are multiple customer voices (e.g., children versus parents). This applies to industrial and government markets as well. There are even multiple customer voices within a single organization: the voice of the procuring organization, the voice of the user, and the voice of the supporting or maintenance organization. These diverse voices must be considered, reconciled and balanced to develop a truly successful product.

Traditionally, Marketing has had responsibility for defining customer needs and product requirements. This has tended to isolate Engineering and other development personnel from the customer and from gaining a firsthand understanding of customer needs. As a result, customer's real needs can become somewhat abstract to other development personnel.

Product development personnel need to be directly involved in understanding customer needs. This may involve visiting or meeting with customers, observing customers using or maintaining products, participating in focus groups or rotating development personnel through marketing, sales, or customer support functions. This direct involvement provides a better understanding of customer needs, the customer environment, and product use; develops greater empathy on the part of product development personnel, minimizes hidden knowledge, overcomes technical arrogance, and provides a better perspective for development decisions. These practices have resulted in fundamental insights such as engineers of highly technical products recognizing the importance to customers of ease of use and durability rather than the latest technology.

Where a company has a direct relationship with a very small number of customers, it is desirable to have a customer representative(s) on the product development team.

Caution Mechanisms such as focus groups should be used where there are a larger number of customers to insure on-going feedback over the development cycle.

Notes

Current customers as well as potential customers should be considered and included. This customer involvement is useful for initially defining requirements, answering questions and providing input during development, and critiquing a design or prototype.

Who do we talk to? Current customers are the first source of information if the product is aimed at current market. In addition, it is important to talk with potential customers. Potential customers are the primary source of information if the product is aimed at new market. In addition, talk with competitor's customers. They provide a good source of information on strengths on competitor's products and why they don't buy from us. Lead customers are a special class of customers that can provide important insights, particularly with new products. Lead customers are those customers who are the most advanced users of the product, customers who are pushing the product to its limits, or customers who are adapting an existing product(s) to new uses.

During customer discussions, it is essential to identify the basic customer needs. Frequently, customers will try to express their needs in terms of HOW the need can be satisfied and not in terms of WHAT the need is. This limits consideration of development alternatives. Development and marketing personnel should ask WHY until they truly understand what the root need is. Breakdown general requirements into more specific requirements by probing what is needed. Challenge, question and clarify requirements until they make sense. Document situations and circumstances to illustrate a customer need. Address priorities related to each need. Not all customer needs are equally important. Use ranking and paired comparisons to aid to prioritizing customer needs. Fundamentally, the objective is to understand how satisfying a particular need influences the purchase decision.

In addition to obtaining an understanding of customer needs, it is also important to obtain the customer's perspective on the competition relative to the proposed product. This may require follow-up contact once the concept for the product is determined or even a prototype is developed. The question to resolve is: How do competitive products rank against our current or proposed product or prototype?

Self Assessment

Fill in the blanks:

7. The voice of the customer is a process used to capture the …….. from the customer.
8. Product development personnel need to be directly involved in understanding …… needs.
9. Where a company has a direct relationship with a very small number of customers, it is desirable to have a …… on the product development team.
10. ……. customers are the first source of information if the product is aimed at current market.

12.5 Organization of Information

Once customer needs are gathered, they then have to be organized. The mass of interview notes, requirements documents, market research, and customer data needs to be distilled into a handful of statements that express key customer needs. Affinity diagramming is a useful tool to assist with this effort. Brief statements which capture key customer needs are transcribed onto cards. A data dictionary which describes these statements of needs are prepared to avoid any misinterpretation. These cards are organized into logical groupings or related needs. This will make it easier to identify any redundancy and serves as a basis for organizing the customer needs.

Notes

Caution In addition to "stated" or "spoken" customer needs, "unstated" or "unspoken" needs or opportunities should be identified.

Needs that are assumed by customers and, therefore not verbalized, can be identified through preparation of a function tree. Excitement opportunities (new capabilities or unspoken needs that will cause customer excitement) are identified through the voice of the engineer, marketing, or customer support representative. These can also be identified by observing customers use or maintain products and recognizing opportunities for improvement

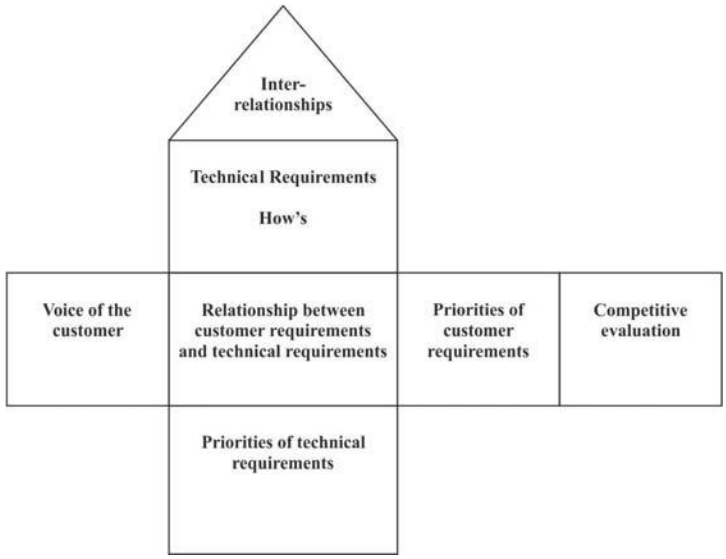
Caselet

House of Quality

The House of Quality is the first matrix in a four-phase QFD (Quality Function Deployment) process. It's called the House of Quality because of the correlation matrix that is roof shaped and sits on top of the main body of the matrix. The correlation matrix evaluates how the defined product specifications optimize or sub-optimize each other.

It is shown in the Figure 1.

Figure 1: House of Quality



12.5.1 Building House of Quality

House of Quality, introduced by Hauser and Clausing, is the most commonly used matrix in traditional QFD methodology in order to translate the desires of customers into product design or engineering characteristics and subsequently into product characteristics, process plans and production requirements. The house of quality is applied for identifying customer requirements and establishing priorities of design requirements to satisfy CRs. The aim is providing right products for the right customers.

Notes

The house is made up of three main parts: the customer attributes or customer requirements (horizontal section); engineering customer requirements section indicates "the voice of customers". It shows the requirement of the customers and what they think is important in the product and also relative importance of the different customer attributes. Design requirements section records the technical aspects of designing a product. It indicates, "How the customer wants can be met". The objectives and targets section (basement of the house) indicates the relative importance of the different engineering characteristics and also indicates target levels or measures of effectiveness for each. The roof of the house indicates the positive and negative relationships between the design requirements. The centre of the house describes the correlation between the design requirements and the customer attributes. The strength and direction of each relationship is represented by a graphical symbol creating a matrix of symbols indicating how well each engineering characteristic meets each customer attribute.

Each step of building House of quality is briefly explained below:

Step 1: Voice of the customer

- The voice of the customer is the primary input the QFD process.
- What that a customer needs?
- Market survey, sales persons, service team, customer complaints, customer feed back, Product testing, comparative studies, etc. are the sources to determine the needs.

Step 2: Determine technical requirements

- Technical requirements are design characteristics that describe the customer requirements as expressed in the language of the designer or an engineer.
- HOWs by which the company will respond to the WHATs.

Step 3: Develop relationship between customer needs and technical descriptors

- It develops a relationship matrix which checks whether final technical descriptors adequately address customer requirements.
- 9:3:1 weightage is used to indicate relationship between them where 9 indicates strong relationship and 1 indicating weak relation.
- This process ensures defining strong relationship.

Step 4: Assess the competitor

- Each customer requirement is evaluated with competitors existing products
- A scale of 1 to 5 can be used
- Evaluates strengths and weaknesses
- Provides opportunities for improvements
- Helps in developing marketing strategies

Step 5: Develop prioritized customer requirements

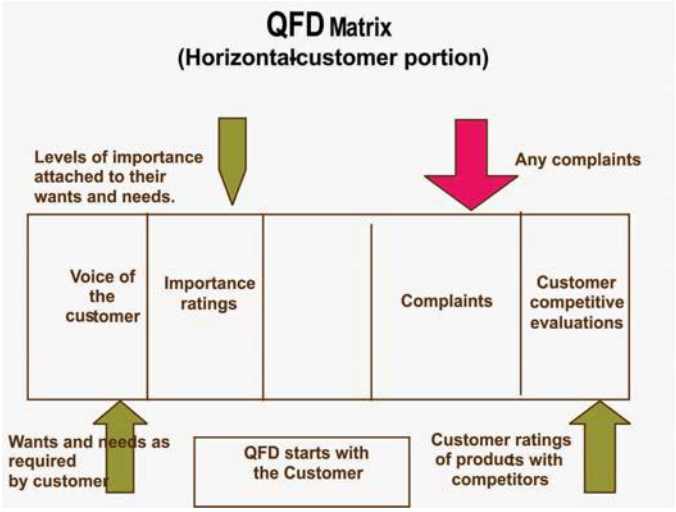
- Ranking is done to each customer requirement by assigning ratings
- Focus groups can be used for ranking
- Represents relative importance of each customer requirement
- Helps in prioritizing and making trade off decisions

Notes

Step 6: Develop prioritized technical requirements

- Identifies most needed product specifications which fulfill customer requirements.
- They provide specific objectives to guide design process.

Figure 12.1: QFD Matrix



Task Make a presentation on the House of Quality and how is it built.

Self Assessment

Fill in the blanks:

11. …….. opportunities are identified through the voice of the engineer, marketing, or customer support representative.
12. The House of Quality is the …….. matrix in a four-phase QFD process.
13. The ……. matrix evaluates how the defined product specifications optimize or sub-optimize each other.
14. House of Quality was introduced by…….. .
15. The roof of the house indicates the ……. relationships between the design requirements.

12.6 QFD Process

Quality Function Deployment (QFD) is a structured, multi-disciplinary technique for product definition that maximizes value to the customer. The application of the QFD process is an art that varies somewhat from practitioner to practitioner. The Figure 1 on page 206 shows a concept called the QFD House of Quality (HOQ), a device for organizing the flow of thinking and discussion that leads to finished product specifications. The House of Quality is built by a firm's own multi-disciplinary team under guidance from a trained QFD facilitator (preferably a facilitator with both marketing and technical experience).

Notes

Given one or more specific objectives (e.g. a narrow focus such as "optimize engine performance" or a more global focus such as "optimize overall passenger comfort"), the QFD process starts with obtaining customer requirements through market research. These research results are inputs into the House of Quality. Here a discussion of each of the rooms of the House of Quality and how they are built is given.

The "Whats" Room: Typically there are many customer requirements, but using a technique called affinity diagramming, the team distils these many requirements into the 20 or 30 most important needs. The affinity diagramming process is critical to the success of QFD in that there is vigorous discussion to reach consensus as to what the customers really meant by their comments. This is a powerful technique for reconciling the different interpretations held by marketing, design engineering or field service. The affinity diagramming process usually takes about one to two solid team days to complete, depending on how narrow or global the objective is. The results from the affinity diagramming are placed into the "Whats" room in the HOQ.

The Importance Ratings and Customer Competitive Assessment Rooms: Marketing and/or the market researcher designs the market research so that the team can use the results as inputs to successfully complete the Importance Ratings and Customer Competitive Assessment rooms. These rooms are located on the matrix where benefit rankings and ratings are assembled for analysis. The Importance Rankings provide the team with a prioritization of customer requirements while the Customer Competitive Assessment allows us to spot strengths and weaknesses in both our product and the competition's products.

The "Hows" Room: The next step is the completion of the "Hows" room. In this activity the entire team asks for each "What", "How would we measure product performance which would provide us an indication of customer satisfaction for this specific 'What'?" The team needs to come up with at least one product performance measure, but sometimes the team recognizes that it takes several measures to adequately characterize product performance.

Relationships Matrix Room: After the "Hows" room has been completed, the team begins to explore the relationships between all "Whats" and all "Hows" as they complete the Relationships Matrix room. During this task the team systematically asks, "What is the relationship between this specific 'how' and this specific 'what'?" "Is there cause and effect between the two?" This is a consensus decision within the group. Based on the group decision, the team assigns a strong, medium, weak or no relationship value to this specific "what/how" pairing. Then the team goes on to the next "what/how" pairing. This process continues until all "what/how" pairings have been reviewed. The technical community begins to assume team leadership in these areas.

Absolute Score and Relative Score Rooms: Once the Relationships Matrix room has been completed, the team can then move on to the Absolute Score and Relative Score rooms. This is where the team creates a model or hypothesis as to how product performance contributes to customer satisfaction. Based on the Importance Ratings and the Relationship Matrix values, the team calculates the Absolute and Relative Scores. These calculations are the team's best estimate as to which product performance measures ("hows") exert the greatest impact on overall customer satisfaction. Engineering now begins to know where the product has got to measure up strongly in order to beat the competition.

The last three rooms receive the most input from the technical side of the team, but total team involvement is still vital.

Correlation Matrix Room: There are times in many products where customer requirements translate into physical design elements which conflict with one another; these conflicts are usually reflected in the product "hows". The Correlation Matrix room is used to help resolve these conflicts by highlighting those "hows" which have are share the greatest conflict.

Notes

For example, let's say that the "how" called "weight" should be minimized for greatest customer satisfaction. At the same time there might be two other "hows" titled "strength" and "power capacity". The customer has expressed preferences that these be maximized. Based on what we know about physics, there may be a conflict in minimizing "weight" and maximizing "strength" and "power capacity". The analysis that takes place in the Correlation Matrix Room systematically forces a technical review for all likely conflicts and then alerts the team to either optimize or eliminate these conflicts or consider design alternatives.

The mechanics of the analysis is to review each and every "how" for possible conflict (or symbiosis) against every other "how". As mentioned in the previous sentence sometimes symbiotic relationships between "hows" do surface in this analysis. This analysis also allows the team to capitalize on those symbiotic situations.

Technical Competitive Assessment Room: This is the room where engineering applies the measurements identified during the construction of the "Hows" room. "Does our product perform better than the competitive product according to the specific measure that we have identified?" Here is where the team tests the hypothesis created in the Relative Score room. It helps the team to confirm that it has created "hows" that make sense that really do accurately measure characteristics leading to customer satisfaction.

Analysis in the Technical Competitive Assessment and Customer Competitive Assessment rooms can also help uncover problems in perception.

Example: Perhaps the customer wants a car that is fast, so your team comes up with the "how" of "elapsed time in the quarter mile". After comparing performance between your car and the competitor's vehicle, you realize that "you blew the doors off the competitor's old crate". However when you look in the Customer Competitive Assessment Room, you see that most of the marketplace perceives the competitor's car as being faster. While you might have chosen one of the correct "hows" to measure performance, it is clear that your single "how" does not completely reflect performance needed to make your car appear faster.

Target Values Room: The last room of Target Values contains the recommended specifications for the product. These specifications will have been well thought out, reflecting customer needs, competitive offerings and any technical trade-off required because of either design or manufacturing constraints.

The House of Quality matrix is often called the phase one matrix. In the QFD process there is also a phase two matrix to translate finished product specifications into attributes of design (architecture, features, materials, geometry, subassemblies and/or component parts) and their appropriate specifications. Sometimes a phase three matrix is used to attributes of design specifications into manufacturing process specifications (temperature, pressure, viscosity, RPM, etc.).

Self Assessment

Fill in the blanks:

16. The …… process is critical to the success of QFD in that there is vigorous discussion to reach consensus as to what the customers really meant by their comments.
17. The …….. provide the team with a prioritization of customer requirements.
18. Customer ……. allows us to spot strengths and weaknesses in both our product and the competition's products.
19. Based on the Importance Ratings and the …… values, the team calculates the Absolute and Relative Scores.

Notes

12.7 Reliability

Reliability is the most important characteristics of any product, irrespective of the nature of the product and nature of its application. It has maximum influence on customer satisfaction as every customer would like to buy products which reliable. They always look for long service life, with long time between failures.

Reliability is defined as the probability of the product to perform as expected for a certain period of time, under given operating conditions, and at given set of product performance characteristics. It includes the safety of the product or process.

12.7.1 Reliability Requirements

Acceptance of any product or process depends on meeting certain set of requirements of reliability. Since reliability is a relative term, it may lead to different perceptions from the point of view of customer and supplier. Hence it is very important to define requirements of reliability to arrive at a common agreement in order to eliminate any differences. This common agreement could be on the basis of the reliability of similar systems in the past, and criticality of failure. Failure Mode and Effect Analysis (FMEA) can be used for requirements analysis.

12.8 Failure Rate

Reliability is determined by the number of failure per unit time during the duration under consideration which is called failure rate. Products may have to be either scrapped and replaced upon failure or they have to be repaired.

Failure Rate = Number of failures/Total unit operating hours

Self Assessment

Fill in the blanks:

20. ……. is defined as the probability of the product to perform as expected for a certain period of time, under given operating conditions, and at given set of product performance characteristics.
21. Reliability is determined by the number of ……. per unit time during the duration under consideration which is called failure rate.

Case Study

Mission: Quality

Wipro Corp. is one organization that decided to change its tolerance level. A diversified conglomerate headquartered in Bangalore, India, the company reports that using the Six Sigma methodology during the past 15 months eliminated unnecessary steps and decreased rework, leading to an eightfold gain over the investments made.

It wasn't a difficult decision for the organization, notes Subroto Bagchi, corporate vice president of mission quality. "Our international software services' customers depend on us for mission-critical applications, which we run on their behalf from halfway across the globe via satellite links," he says. "In the Indian market, we make soaps, computers,

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Notes

hydraulic cylinders and computerized tomography scanners. Which customer is willing to live with a defect? There's no question of delivering anything less than perfect."

Wipro executives had heard about Six Sigma via the company's partnerships with General Electric Co., so Bagchi attended a quality briefing at Motorola University in Chicago. Afterward, in November 1996, an MU team visited India to conduct a business systems analysis.

Results were shared with top management from Wipro's five divisions, and they developed an 18-month plan. The chairman and senior management participated in a six-day training retreat. Then 12 facilitators, chosen from among successful line managers, were trained. Together with MU personnel, these facilitators trained nearly 800 people between May and November 1997. This year, about 1,000 more employees will be trained.

"The entire scenario is like the fractal geometry exhibited in the petals of a flower," observes Bagchi. "Certified trainers train people who, in turn, train others, bringing a whole new change in the way we think and work."

Wipro's corporate goal is to reach Six Sigma in every process concerning customer satisfaction by the year 2002.

Lofty, but not impossible

Six Sigma is a stretch goal intended to spur continuous improvement. Success doesn't come by radically restructuring a company or pumping new money into it; Six Sigma is attainable through time and strong dedication.

New thought and manufacturing processes

Thinking outside the box also is important. "Before Six Sigma, we were interested in continuous improvement, but we tended to accept quality levels that merely mirrored our competitors'," notes Craig Erwin, quality engineering manager at Motorola Semiconductor Products Sector in Phoenix, Arizona. "We were somewhat internally focused and accepted the argument that things couldn't be made better." understood that our management team was serious about it, we accepted the challenge.

It's part of the SPS culture now. All new employees receive Six Sigma training during their orientation. For those who went through training years ago, the company also offers them an opportunity to recharge their commitment through a combination of classes and a renewed emphasis by senior management. Various customer satisfaction activities reward ideas and implementation.

"One thing we looked at was changes in our thought and manufacturing processes to eliminate rework," reveals Erwin. "In the short term, we saw some increased costs, but in the long run, we've improved our processes and applied more effective controls. We continue to see improvements in product reliability, manufacturing yields and internal quality metrics, despite increasing product complexity and higher customer expectations."

Product complexity continues to grow exponentially. Future products such as semiconductors and software undoubtedly will contain tens of millions, even billions, of elements. Creating more robust designs and reducing opportunities to introduce defects into the final product represents a onetime expense. If it's not done, however, repair, rework, excessive scrap costs and unhappy customers will continue through the product's life. Thus, it's imperative that companies reduce defect rates to a few parts per billion.

"Although Motorola has made huge reductions in defect rates, we still haven't achieved Six Sigma overall," reports Berg. "Motorola considers itself a 5.7 Sigma company now. Six Sigma remains a very noble goal, but it's the rate of improvement that's important. Six Sigma has saved the company billions of dollars in terms of scrap and rework, enabling greater customer satisfaction—our ultimate goal."

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Six Sigma successes

After examining how various financial companies pursue quality, Citibank, the international financial division of Citicorp, undertook the Six Sigma method in the spring of 1997. Its goal: to reduce defects within its various divisions by a factor of 10 during the first three years. The corporation already has seen reductions ranging from five to 10 times.

"Six Sigma appealed because it's pretty straightforward," comments James Bailey, Citicorp's executive vice president and corporate quality officer. "It also seemed like a programme that would involve everyone."

Previously, various businesses and divisions within Citibank had tried different quality programmes, but the company had never instituted a universal quality language or method.

"Continuous improvement is our goal," maintains Bailey. "We started training senior management in April 1997, and so far we've trained about 2,000 people around the world." Besides the defect reductions, the company has recorded a decreased response time for credit card applications and fewer errors in customer statements.

"We're on track," he declares. "We're more customer-focused. We know it's a long road, but we've made a reasonable start, and we're pleased."

GE, which launched a Six Sigma initiative in late 1995, says the $300 million invested in quality improvement in 1997 will deliver some $400 million to $500 million in savings. "Quality improvement, under the disciplined rubric of Six Sigma methodology, will define the way we work," the company announced in its 1996 annual report.

A three- to four-sigma level, average for most U.S. companies, can cost a company as much as 10 per cent to 15 per cent of its revenues. For GE, that would mean $8 billion to $12 billion.

"The methodologies of Six Sigma we learnt from other companies, but the cultural obsessiveness and all-struggle to achieve a boundaryless culture now seems 'laid-back' compared to the near monomania with which we are approaching Six Sigma quality."

Wipro also reports successes in its first year. "First of all, we now have a common language across our divisions," explains Bagchi. "People talk about the customer, defects, Sigma level and a plan for continuous improvement."

"In India, many people have difficulty giving up the old and embracing the new, but the mind-set is changing. Six Sigma is making people look outward. We're shifting from an organizational focus to a customer focus."

Wipro's trained teams have launched close to 30 projects, including three major cross-functional undertakings. "Defects are steadily falling in cylinder manufacturing," discloses Bagchi. "In the fixed deposits area of our Financial Services division, we've established a process to eliminate nonvalue-added steps and mistake-proof the system. We're also projecting a 30 per cent cycle-time reduction in our computer business. The estimated near-term gains will be six to eight times the total investments we've made in Six Sigma."

The first step

Other re-engineering programmes often advocate tearing down an organization and rebuilding from scratch. MU advises organizations to start where they are, build on current successes and modify current processes. They must rely on the interwoven concepts of defect reduction, which encourages employees to relate more to each other, and cycle-time reduction, which eliminates unnecessary, nonvalue-adding steps from processes.

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Six Sigma requires more than a monetary investment, Erwin points out. "You must have a plan, necessary resources, the commitment of everyone and uncompromising matrixes," he says. "Then you set aggressive goals along the path and hold people accountable."

The MU Six Sigma programme emphasizes the following key components:

1. A goal of total customer satisfaction.
2. A common language throughout the organization.
3. Common, uniform quality measurement techniques for all business areas.
4. Goals with identical improvement rates, based on uniform matrixes.
5. Goal-directed incentives for both employees and management.
6. Coordinated training in "why" and "how" to achieve the goal.

No one set procedure will work when following the Six Sigma method. Every company is different and must account for its strengths and weaknesses, then leverage them accordingly.

"A clear, quantitative understanding of customer satisfaction typically is accomplished through surveys," notes Hayes. "Surveys should identify gaps between customer needs and a company's current performance level. Then, through benchmarking, a company's core processes are compared to another best-in-class performer. This is useful in determining the first layer of needed goals."

Motorola SPS statistician Skip Weed has been involved with Six Sigma since the programme began. "The major impact, especially when it first started, was on our culture – the people and systems required to produce high-quality products and services," he recalls. "Previously, there was minimal effort in preventing defects rather than inspecting them out. The directive for the programme came from our highly respected CEO, who was strongly behind it, and everyone then began to buy in."

Management by fact, not emotion

Ron Randall, quality improvement manager at Raytheon TI Systems, says his company is impressed with Six Sigma's quantitative methods. "We looked at our products and compared them to similar ones from Motorola," he explains. "We were less than four Sigma, and Motorola was close to six. We couldn't believe someone was 2,000 times better than us. It really got our attention."

"Six Sigma really will work for anybody. It's management by fact, not emotion."

MU consultant Paul Zaura concurs. "In a math sense, Six Sigma is a known quantity," he asserts. "As improvements increase, expectations increase. Customer perceptions will change, and they will drive you to places you never new existed.

"You also must look at the cultural aspects and changing behaviours. Many corporate cultures are fear-based; mistakes aren't tolerated, and people learn to hide defects. Six Sigma flourishes in an open and safe environment."

Six Sigma champions say there are plenty of things to count, measure and benchmark regardless of the type of business, whether it's an attorney's office or a car rental company. And within a company, you can look at all kinds of divisions - personnel policies, warehousing, security, how to run the cafeteria.

"If you're not improving, you're going down," warns Zaura. "Six Sigma is a philosophy of continuous improvement and measurement to drive the direction of goals. Its concepts aren't earthshaking: Talk to customers and find out what the defects are. Work on big errors first. Try to decide how they happen and how to correct them permanently."

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"Whether it's handling paperwork, an idea, a customer call or a hard product, there must be a process for it. That's probably one of the biggest concepts for people to grasp. Then you track your process using simple tools like Pareto charts, cause-and-effect diagrams and benchmarking. You compare what you have to a similar industry or process."

Perhaps Six Sigma's biggest mandate is never rest.

Companies that are content with their current quality levels simply don't understand quality's true challenge. They need to determine not only the defect levels their customers experience but also internal defects that cause rework, additional inspections and higher product costs. Once a company has fully assessed itself, then improvement can really begin.

And no philosopher or cynic can quibble with improvement.

Question:

Discuss how Wipro used six sigma methodology to decrease workload & streamline the work process.

Source: http://www.qualitydigest.com/july98/html/sixsigma.html

12.9 Summary

- Quality Function Development is a scientific technique for translating the voice of the customer into the development of products and services.
- The technique was invented by Akashi Fukuhara of Japan and first applied with very good results at Toyota.
- The purpose of Professors Mizuno and Akao was to develop a quality assurance method that would design customer satisfaction into a product before it was manufacturer.
- QFD is a comprehensive quality system that systematically links the needs of the customer with various business functions and organizational processes, such as marketing, design, quality, production, manufacturing, sales, etc. aligning the entire company toward achieving a common goal.
- The success of QFD in any organization depend on the team involved in QFD process and it requires commitment from project and team members and also significant amount of efforts are needed from each one of the team members.
- QFD teams must ensure that they meet regularly and it is duty of the team leader to ensure that meetings are effectively held and all members are kept informed about the meetings.
- QFD through documentation helps in building product development intelligence, preventing recurrence of errors, helping new engineers to learn processes faster without assistance of senior managers and engineers.
- The "voice of the customer" is a process used to capture the requirements/feedback from the customer (internal or external) to provide the customers with the best in class service/ product quality.
- Product development personnel need to be directly involved in understanding customer needs.
- Potential customers are the primary source of information if the product is aimed at new market.

Notes

- Excitement opportunities (new capabilities or unspoken needs that will cause customer excitement) are identified through the voice of the engineer, marketing, or customer support representative.
- House of Quality is so called because of the correlation matrix that is roof shaped and sits on top of the main body of the matrix.
- The house of quality is applied for identifying customer requirements and establishing priorities of design requirements to satisfy CRs. The aim is providing right products for the right customers.
- The objectives and targets section (basement of the house) indicates the relative importance of the different engineering characteristics and also indicates target levels or measures of effectiveness for each.
- The application of the QFD process is an art that varies somewhat from practitioner to practitioner.
- Analysis in the Technical Competitive Assessment and Customer Competitive Assessment rooms can help uncover problems in perception.
- Reliability has maximum influence on customer satisfaction as every customer would like to buy products which reliable.

12.10 Keywords

Affinity Diagramming: An Affinity Diagram is a tool that gathers large amounts of language data (ideas, opinions, issues) and organizes them into groupings based on their natural relationships.

Epistemology: Epistemology is the investigation of what distinguishes justified belief from opinion.

House of Quality: A house of quality is a product planning matrix, somewhat resembling a house, that is developed during quality function deployment and shows the relationship of customer requirements to the means of achieving these requirements.

Market Research: A research that gathers and analyzes information about the moving of good or services from producer to consumer is called as market research.

Organization of Information: It is a term used to refer to the standard protocols by which information is arranged.

Quality Assurance: Quality assurance is a structured review of the project by an external resource, to determine the overall project performance and conformance.

Quality Function Development: A systematic methodology that focuses on exactly translating customer wishes to product changes to process changes is known as QFD.

Systems Thinking: Systems thinking is a method of formal analysis in which the object of study is viewed as comprising distinct analytical sub-units.

Value Engineering: Systematic evaluation of all aspects of the value-chain business functions, with the objective of reducing costs while satisfying customer needs is known as value engineering.

Voice of the Customer: In six sigma and other quality improvement programs, the identification and prioritization of true customer needs and requirements through the use of focus groups, interviews and other methods is referred to as voice of the customer.

Notes

12.11 Review Questions

1. What do you understand by the concept of Quality Function Development?
2. Explain the development of quality Function Deployment.
3. How do you think is the team involved in QFD process responsible for its success in the organization?
4. List the benefits of QFD.
5. What do you mean by voice of the customer?
6. Write a detailed note on house of quality and how is it built?
7. Briefly explain the steps of building house of quality.
8. Explain QFD process.
9. Define reliability. What are its requirements?
10. Explain failure rate.

Answers: Self Assessment

1.	Quality Function Development	2.	Bridgestone Tire
3.	QFD	4.	Top management
5.	Time utilization	6.	Analytic
7.	Feedback	8.	Customer
9.	Customer representative	10.	Current
11.	Excitement	12.	First
13.	Correlation	14.	Hauser and Clausing
15.	Positive and negative	16.	affinity diagramming
17.	Importance Rankings	18.	Competitive Assessment
19.	Relationship Matrix	20.	Reliability
21.	Failure		

12.12 Further Readings

Books

Besterfield Dale H. (2011). *Total Quality Management*. Pearson Education.

Charantimath M. Poornima (2009). *Total Quality Management*. Pearson Education.

Mukherjee N. P. (2006). *Total Quality Management.* PHI Learning Pvt. Ltd.

Nigam Shailendra (2009). *Total Quality Management.* Excel Books.

Online links

http://www.ieee.li/tmc/quality_function_deployment.pdf

http://www.ciri.org.nz/downloads/Quality%20Function%20Deployment.pdf

http://www.public.iastate.edu/~vardeman/IE361/s00mini/chen.htm

http://www.me.utexas.edu/~me366j/QFD/Notes.html

Notes

Unit 13: Failure Mode and Effect Analysis

CONTENTS

Objectives

Introduction

13.1 The FMEA

13.1.1 FMEA Process

13.1.2 FMEA Team

13.1.3 FMEA Documentation

13.2 Stages of FMEA

13.3 Benefits of FMEA

13.4 Taguchi Techniques

13.5 Loss Function

13.6 Parameter Design

13.7 Tolerance Design

13.8 Signal to Noise Ratio

13.9 Summary

13.10 Keywords

13.11 Review Questions

13.12 Further Readings

Objectives

After studying this unit, you will be able to:

- Define failure modes and effects analysis
- Discuss the relationship of cause, failure mode and effect
- Explain the FMEA process
- Discuss FMEA team and documentation
- Explain the stages of FMEA
- Discuss Taguchi Techniques and Tolerance Design

Introduction

In the previous unit, we dealt with the concept of Quality Function Deployment. In this unit, you will study about the FMEA approach, i.e. Failure Mode and Effect Analysis.

Failure Mode and Effect Analysis (FMEA) has been a widely accepted Quality Management tool. Due to ISO 9000 and QS-9000 standards requirements, FMEA is now applied widely in electrical, electronics, telecom and automobile industries with more regularity.

Notes

13.1 The FMEA

Failure Modes and Effects Analysis (FMEA) is a step-by-step approach for identifying all possible failures in a design, a manufacturing or assembly process, or a product or service.

"Failure modes" means the ways, or modes, in which something might fail. Failures are any errors or defects, especially ones that affect the customer, and can be potential or actual.

"Effects analysis" refers to studying the consequences of those failures.

Failures are prioritized according to how serious their consequences are, how frequently they occur and how easily they can be detected. The purpose of the FMEA is to take actions to eliminate or reduce failures, starting with the highest-priority ones.

Failure modes and effects analysis also documents current knowledge and actions about the risks of failures, for use in continuous improvement. FMEA is used during design to prevent failures. Later it's used for control, before and during ongoing operation of the process. Ideally, FMEA begins during the earliest conceptual stages of design and continues throughout the life of the product or service.

Did u know? FMEA was developed in US Military. Military procedure MIL- P-1629, titled Procedures for Performing a Failure Mode, Effects and Criticality Analysis, is dated November 9, 1949. It was used as a reliability evaluation technique to determine the effect of equipment and system failures.

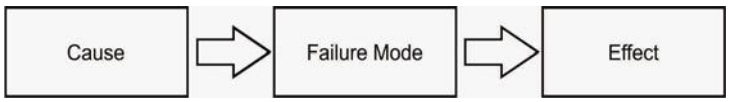
FMEA is a structured approach for:

1. Identifying ways in which a process can fail to meet critical customer requirements.
2. Estimating the risk of causes with regard to these failures.
3. Evaluating control plan for preventing these failures.
4. Prioritizing the actions for improving the process.

When to use FMEA:

- For improving the reliability and safety of the products.
- For improving customer satisfaction.
- Tracking actions to reduce non-conformities.
- New product development

Figure 13.1: Relationship of Cause, Failure and Effect



Self Assessment

Fill in the blanks:

1. FMEA stands for …….. .
2. …….. refers to studying the consequences of the failures.
3. FMEA begins during the earliest conceptual stages of …….. and continues throughout the life of the product or service.

Notes

13.1.1 FMEA Process

- Develop a process map and identify process steps.
- List key process outputs for satisfying internal and external customer requirements.
- List key process inputs for each process step.
- List ways in which the process inputs can vary (causes) and identify associated failure modes and effects.
- Assign severity occurrence and detection rating for each cause.
- Calculate Risk Priority Number (RPN) for each potential failure mode.
- Determine recommended actions to reduce RPN's.
- Establish time frame for corrective actions.
- Take corrective actions.
- Put all controls in place

Figure 13.2: FMEA by using Cause & Effect Diagram

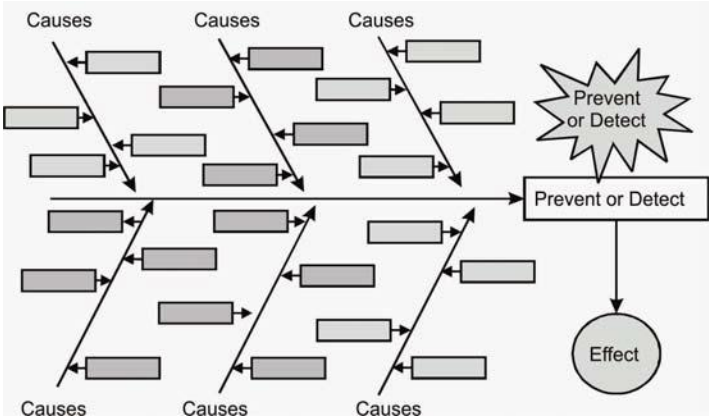


Figure 13.2 shows a model of Cause and Effect diagram used in FMEA. As the diagram shows, for every effect there is a failure mode. Further it is shown that a defect causes a failure mode. Cause and Effect analysis is carried out by the employees of the organization. The thought process, through brainstorming, generates the likely forms of failures and their effects and then finds out the likely causes of these failures. These can be in the categories of materials, manpower, equipment, environment etc.

13.1.2 FMEA Team

Cross functional teams are used for FMEA. The FMEA methodology is a team effort where the responsible engineer involves people from assembly, manufacturing, materials, quality, service, and other functional areas. The team is headed by team leader, who has the responsibility of conducting meetings, determining meeting schedules, communicating meeting schedules and agenda to all the members, and coordinating on corrective actions determined. He is also responsible for ensuring participation of all team members. He shall maintain all FMEA records and distributes them to all the members as and when they are needed.

Notes

Self Assessment

Fill in the blanks:

4. For every ……. there is a failure mode.
5. A defect causes a ……. mode.
6. Cause and Effect analysis is carried out by the …….. of the organization.
7. ……. teams are used for FMEA.
8. The team leader is responsible for ensuring ……. of all team members.

13.1.3 FMEA Documentation

FMEA generates lot of information and it generates several ideas and these ideas should be available for further use by others when they are useful to them. Hence it is important to document FMEA activities. The purpose of FMEA document is to allow all involved engineers to have access to other's thoughts and to design manufacture using collective group thoughts, which promotes team work.

Notes Documents must be updated on regular basis as changes may occur during design and manufacturing process.

FMEA team generally use block diagrams to show different flows like information, energy, force, fluid, etc. involved in the component or process being analyzed. This diagram helps in understanding inputs, and outputs.

Self Assessment

Fill in the blanks:

9. The purpose of …… is to allow all involved engineers to have access to other's thoughts and to design manufacture using collective group thoughts, which promotes team work.
10. FMEA team generally use ……. to show different flows like information, energy, force, fluid, etc. involved in the component or process being analyzed.

13.2 Stages of FMEA

The five stages of FMEA are listed below:

Stage 1: Poor FMEA Understanding

Typically the organisation in stage one uses FMEAs because it has to meet a paper requirement for a customer or quality standard. Personnel perform the FMEA right before it is due to be turned in to the customer, usually too late in the process to be useful.

Quite often, the wrong people perform the FMEA. The quality department ends up developing the documents rather than making design engineers responsible for design FMEAs and operating personnel responsible for process FMEAs.

Notes

Management does not understand the FMEA, and a lot of confusion and disagreement exists as to how to fill out the FMEA form. Debate occurs when individuals attempt to develop the ratings for occurrence and detection numbers. Because accurate feedback systems don't yet exist to base the ratings on, they're based on inaccurate guesses. Using inaccurate ratings, the organisation calculates erroneous RPNs and identifies an RPN level at which recommended actions are needed. If the number of recommended actions required based on this level is too high, the organisation "adjusts" the ratings to bring the RPNs down below the trigger level, which reduces the number of recommended actions. Obviously, this makes the entire FMEA process meaningless.

As a result, the organisation fulfills its paper requirement, but the value of the FMEA is greatly diminished. Problems still remain unsolved at a high cost to the organisation. The individuals performing the FMEAs believe they are doing them correctly because the customer or auditor is accepting them. Eventually, everyone sees the FMEA process not as a tool but as something that has to be done.

Stage 2: Learning Proper FMEA Techniques

Management ensures that the personnel who will perform and use the FMEA data are trained in the proper technique.

Notes The people who perform design FMEAs must be experts in the product and the people who perform the process FMEAs must be experts in the process.

Rather than being confused by the FMEA terminology, they realize they have used the FMEA methodology before but never called it FMEA. They also learn that although they have used the methodology, they have not used it rigorously enough to achieve its full benefits.

In stage two, everyone involved gains an understanding of what the ratings and class column mean and how to use them to prioritize what must be worked on first. They understand that the class column is the most important factor and not the RPN. Management also realized that they don't have systems in place that will give them data to accurately determine the failure probability occurrence ratings, detection ratings and class. Using the limited objective data they have, they know they will have to use their knowledge of the product and process to arrive at the ratings. Due to the lack of an objective basis, they know that it is a waste of time to argue for long periods about the ratings.

When leaving this stage, those who have been using FMEAs believe they can be a powerful tool. Unfortunately, the people who perform FMEAs doubt whether management will provide the time and resources necessary to support their successful implementation. They also question how they will explain the new approach to their auditor or customer, who may still be at stage one in their understanding of the FMEA implementation process.

Stage 3: Building a Proper FMEA

The organisation begins to use FMEAs correctly on a targeted product. Early on there is excitement that the FMEAs are finally going to be done correctly. As the implementation continues, worry starts to set in as the FMEA uncovers and documents the complexity of the product and process being analysed. Everyone knew the complexity existed but had never seen it documented. The FMEA grows from the 5 or 10 pages that used to be normal to 100 or more pages.

Notes The organisation must overcome its fear of the increased length and complexity of the complete FMEA if FMEAs are to be used successfully.

Notes

As the FMEA process continues, many problems may be uncovered that must be solved if the company is to become as good as it can be. There may not be enough resources to solve all of these problems and still meet the launch deadline.

Knowing this, people begin to proclaim that FMEAs will never work. They believe that all the hard work has been a waste of time. What good is it to know what is wrong and not be able to correct it? Life was a lot easier when all the problems were not documented. If organisations don't overcome this obstacle they may slip back into stage one.

Stage 4: Using a FMEA's Outputs

Management realises that the length of a FMEA cannot be predetermined. The complexity of the product and process being analysed determines the FMEA's length. Management understands that all of the problems uncovered in the FMEA can't be solved in one product launch. They understand that the product will be launched with known problems and that they will have to make objective decisions as to what to work on during this launch and what must be delayed. When a problem occurs in an area that management decided not to work on, it is handled without emotion. This is possible because the FMEA identified that it might happen and management chose not to work on it so that other problems could be prevented.

Once the organisation launches the product, management creates a long-term plan to improve the design and manufacturing systems. This plan minimizes the times the company must make difficult decisions when doing FMEAs in the future.

Stage 5: Full FMEA Implementation and Integration

The organisation has implemented new design and manufacturing systems to answer the majority of the problems identified in the FMEAs. Systems now exist to provide data to accurately set occurrence and detection ratings. Due to the accuracy of the new ratings, predictions about field failures and process yields can be made. The class column can now be accurately determined and actions required for improvement prioritized.

Design engineers review design FMEAs before making design changes. If a change must be made, operating personnel review the process FMEA and control plan to determine the impact the change will have on the process.

When a problem occurs, the appropriate personnel consult the FMEAs. If the FMEA inadequately addressed the problem, engineers make changes to the design and manufacturing system to ensure that all possible steps have been taken to prevent a similar problem in the future.

The organisation uses the FMEAs as training tools because they contain the collective knowledge of the company's experts.

Task Prepare a FMEA model of a company based on the stages of FMEA you have studied.

Self Assessment

Fill in the blanks:

11. Management ensures that the personnel who will perform and use the ……. data are trained in the proper technique.
12. Due to the lack of a/an ……. basis, they know that it is a waste of time to argue for long periods about the ratings.

Notes

13. The organisation must overcome its fear of the ……. and complexity of the complete FMEA if FMEAs are to be used successfully.
14. Management realises that the …….. of a FMEA cannot be predetermined.
15. …….. engineers review design FMEAs before making design changes.

13.3 Benefits of FMEA

FMEA is designed to assist the engineer improve the quality and reliability of design. Properly used the FMEA provides the engineer several benefits.

The various benefits of FMEA are:

- Improve product/process reliability and quality
- Increase customer satisfaction
- Early identification and elimination of potential product/process failure modes
- Prioritize product/process deficiencies
- Capture engineering/organisation knowledge
- Emphasizes problem prevention
- Documents risk and actions taken to reduce risk
- Provide focus for improved testing and development
- Minimises late changes and associated cost
- Catalyst for teamwork and idea exchange between functions.

13.4 Taguchi Techniques

Genichi Taguchi, a Japanese engineer, proposed several approaches to experimental designs that are sometimes called "Taguchi Methods." These methods utilise two-, three-, and mixed-level fractional factorial designs. Large screening designs seem to be particularly favored by Taguchi adherents.

Taguchi refers to experimental design as "off-line quality control" because it is a method of ensuring good performance in the design stage of products or processes. Some experimental designs, however, such as when used in evolutionary operation, can be used on-line while the process is running.

Caution The Japanese implementation of Taguchi's concept sees them working on the principle that when designing a product, it should be designed with minimum loss, with the relative product being designed as close to the optimum value as is feasibly possible. This would result in the product being manufactured in regards to its life cycle and customer satisfaction from the design stages. It would also mean that less repair work would be required in the long run.

Taguchi's response to quality differs rather greatly from the goalpost philosophy of the European and American countries.

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Caselet

Taguchi Philosophy

It is being increasingly recognised that the high quality of a product or service and the associated customer satisfaction are the key for enterprise survival. Also recognised is the fact that pre-production experiments, assuming properly designed and analysed, can contribute significantly towards quality improvements of a product. A traditional (but still very popular) method of improving the quality of a product is the method of adjusting one factor at a time during pre-production experimentation. In this method, the engineer observes the result of an experiment after changing the setting of only one factor (parameter). This method has the major disadvantages of being very costly and unreliable. The Japanese were the first to realise the potential of another method using Statistical Design of Experiments (SDE) – originally developed by R. Fisher. SDE, in contrast to the one factor method, advocates the changing of many factors simultaneously in a systematic way (ensuring an independent study of the product factors). In either method, once factors have been adequately characterised, steps are taken to control the production process so that causes of poor quality in a product are minimised.

Five major points of the Taguchi quality philosophy are:

1. In a competitive market environment, continual quality improvements and cost reductions are necessary for business survival.
2. An important measurement of the quality of a manufactured product is the total loss generated by that product to the society.
3. Change the pre-production experimental procedure from varying one factor at a time to varying many factors simultaneously (SDE), so that quality can be built into the product and the process.
4. The customer's loss due to poor quality is approximately proportional to the square of the deviation of the performance characteristic from its target or nominal value. Taguchi changes the objectives of the experiments and the definition of quality from "achieving conformance to specifications" to "achieving the target and minimising the variability.
5. A product (or service) performance variation can be reduced by examining the non-linear effects of factors (parameters) on the performance characteristics. Any deviation from a target leads to poor quality.

Self Assessment

Fill in the blanks:

16. FMEA is designed to assist the engineer improve the …… and …… of design.
17. Large screening designs seem to be particularly favored by …… adherents.
18. Taguchi refers to experimental design as "off-line quality control" because it is a method of ensuring …….. in the design stage of products or processes.
19. It is being increasingly recognised that the high quality of a product or service and the associated …….. are the key for enterprise survival.

Notes

13.5 Loss Function

Simply put, the Taguchi loss function is a way to show how each non-perfect part produced, results in a loss for the company. Deming states that it shows:

"A minimal loss at the nominal value, and an ever-increasing loss with departure either way from the nominal value."

— W. Edwards Deming, Out of the Crisis

This standard representation of the loss function demonstrates a few of the key attributes of loss.

Example: The target value and the bottom of the parabolic function intersect, implying that as parts are produced at the nominal value, little or no loss occurs.

Also, the curve flattens as it approaches and departs from the target value. (This shows that as products approach the nominal value, the loss incurred is less than when it departs from the target.) Any departure from the nominal value results in a loss!

Loss can be measured per part. Measuring loss encourages a focus on achieving less variation. As we understand how even a little variation from the nominal results in a loss, the tendency would be to try and keep product and process as close to the nominal value as possible. This is what is so beneficial about the Taguchi loss. It always keeps our focus on the need to continually improve.

Application

A company that manufactures parts that require a large amount of machining grew tired of the high costs of tooling. To avoid premature replacement of these expensive tools, the manager suggested that operators set the machine to run at the high-end of the specification limits. As the tool would wear down, the products would end up measuring on the low-end of the specification limits. So, the machine would start by producing parts on the high-end and after a period of time, the machine would produce parts that fell just inside of the specs.

The variation of parts produced on this machine was much greater than it should be, since the strategy was to use the entire spec width allowed rather than produce the highest quality part possible. Products may fall within spec, but will not produce close to the nominal. Several of these "good parts" may not assemble well, may require recall, or may come back under warranty. The Taguchi loss would be very high.

We should consider these vital questions:

Is the savings of tool life worth the cost of poor products?

Would it be better to replace the tool twice as often, reduce variation, or look at incoming part quality?

Calculations

Formulas

Loss at a point: $L(x) = k \times (x-t)^2$

where,

k = loss coefficient

Notes

x = measured value

t = target value

Average Loss of a sample set $L = k \times (s^2 + (pm - t)^2)$

where,

s = standard deviation of sample

pm = process mean

Total Loss = Avg. Loss × number of samples

Illustration: A medical company produces a part that has a hole measuring 0.5" + 0.050". The tooling used to make the hole is worn and needs replacing, but management doesn't feel it necessary since it still makes "good parts". All parts pass QC, but several parts have been rejected by assembly. Failure costs per part is $45.00. Using the loss function, explain why it may be to the benefit of the company and customer to replace or sharpen the tool more frequently. Use the data below:

Measured Value

0.459 | 0.478 | 0.495 | 0.501 | 0.511 | 0.527

0.462 | 0.483 | 0.495 | 0.501 | 0.516 | 0.532

0.467 | 0.489 | 0.495 | 0.502 | 0.521 | 0.532

0.474 | 0.491 | 0.498 | 0.505 | 0.524 | 0.533

0.476 | 0.492 | 0.500 | 0.509 | 0.527 | 0.536

Solution:

The average of the points is 0.501 and the standard deviation is about 0.022.

find k,

using $L(x) = k * (x-t)^2$

$\$45.00 = k * (0.550 - 0.500)^2$

$k = 18000$

next,

using the Average loss equation: $L=k \times (s^2 + (pm - t)^2)$

$L = 18000 \times (.022^2 + (.501 - .500)^2) = 8.73$

So the average loss per part in this set is $8.73.

For the loss of the total 30 parts produced,

= L × number of samples

= $8.73 × 30

= $261.90

From the calculations above, one can determine that at 0.500", no loss is experienced. At a measured value of 0.501", the loss is $0.018, and with a value of 0.536", the loss would be as much as $23.

Even though all measurements were within specification limits and the average hole size was 0.501", the Taguchi loss shows that the company lost about $261.90 per 30 parts being made. If the batch size was increased to 1000 parts, then the loss would be $8730 per batch. Due to variation being caused by the old tooling, the department is losing a significant amount of money.

Notes

From the chart, we can see that deviation from the nominal, could cost as much as $0.30 per part. In addition we would want to investigate whether this kind of deviation would compromise the integrity of the final product after assembly to the point of product failure.

Self Assessment

Fill in the blanks:

20. Taguchi loss function is a way to show how each ……. part produced, results in a loss for the company.

21. Measuring …….. encourages a focus on achieving less variation.

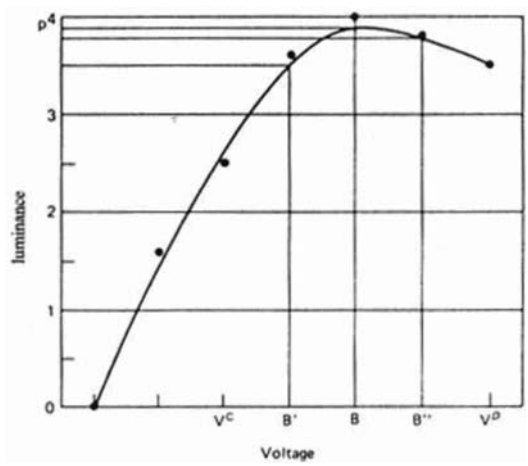
13.6 Parameter Design

When a product is said to be optimum, it implies that the product has achieved most of the target values set out by the quality measure. Taguchi tries to reduce the variation around the target, not by eliminating the cause of variation, since totally removing the cause of variation can be expensive in an industrial setting. The variation is reduced by adjusting the levels of the influencing factors, and controlling the variation of other factors, which is the approach of the parameter design technique.

To illustrate this concept, consider an example involving only one factor:

An electronic device which controls the luminance of a light bulb, was influenced significantly by the applied voltage. The investigator, wishing to select the right voltage, investigate the luminance of the light bulb at several input voltages. The influence of the voltage variation on the luminance of the light bulb can be shown in the Figure 13.3.

Figure 13.3: Voltage Variation on Luminance



If the working range of the applied voltage is between VC and VD as shown in Figure 13.3, obviously, voltage B to B″ would give a variation around targeted value B, but would minimally affect the intensity of the luminance. Voltage B is attractive, since small fluctuations in the applied voltage (B to B″), will have no significant effects on the quality of the luminance as perceived by the user. So, through the parameter design process, the investigator is able to choose a parameter, which is least influenced by the variation factors.

Thus, the performance characteristics of a product can be affected by two factors, namely design parameters, and sources of noise. The design parameters are those nominal product values

Notes

which are selected by the engineers. Sources of noise are those variables that cause the deviations of actual nominal product value. The objective of parameter design experiments are to identify the settings of the design parameters, at which the noise factor influence is at its minimum.

Self Assessment

Fill in the blanks:

22. The variation is reduced by adjusting the levels of the influencing factors, and controlling the variation of other factors, which is the approach of the …….. technique.

23. The performance characteristics of a product can be affected by two factors, namely design parameters, and……. .

13.7 Tolerance Design

Customers for an electronic component complained to their supplier that the measurement reported by the supplier on the as-delivered items appeared to be imprecise. The supplier undertook to investigate the matter.

The supplier's engineers reported that the measurement in question was made up of two components, which we label x and y, and the final measurement M was reported according to the standard formula

$$M = K\,x/y$$

with 'K' a known physical constant. Components x and y were measured separately in the laboratory using two different techniques, and the results combined by software to produce M. Buying new measurement devices for both components would be prohibitively expensive, and it was not even known by how much the x or y component tolerances should be improved to produce the desired improvement in the precision of M.

Assume that in a measurement of a standard item the 'true' value of x is x_o and for y it is y_o. Let $f(x, y) = M$; then the Taylor Series expansion for $f(x, y)$ is

$$\begin{aligned} f(x, y) &= f(x_0, y_0) + (x - x_0)\frac{df}{dx} + (y - y_0)\frac{df}{dy} + (x - x_0)^2\frac{d^2f}{dx^2} \\ &\quad + (y - y_0)^2\frac{d^2f}{dy^2} + (x - x_0)(y - y_0)\frac{d^2f}{dxdy} + (\text{higher - order terms}) \end{aligned}$$

with all the partial derivatives, 'df/dx', etc., evaluated at (x_o, y_o).

Applying this formula to $M(x, y) = Kx/y$, we obtain

$$\begin{aligned} M(x, y) &= K\frac{x_0}{y_0} + (x - x_0)\frac{K}{y_0} - (y - y_0)\frac{Kx_0}{y_0^2} - 2(y - y_0)^2\frac{K}{y_0^3} \\ &\quad - (x - x_0)(y - y_0)\frac{K}{y_0^2} + (\text{higher - order terms}) \end{aligned}$$

It is assumed known from experience that the measurements of x show a distribution with an average value x_o, and with a standard deviation $s_x = 0.003$ x-units.

In addition, we assume that the distribution of x is normal. Since 99.74% of a normal distribution's range is covered by 6s, we take 3s<SUBx = 0.009 x-units to be the existing tolerance T_x for

Notes

measurements on x. That is, $T_x = \pm 0.009$ x-units is the 'play' around x_o that we expect from the existing measurement system.

It is also assumed known that the y measurements show a normal distribution around y_o, with standard deviation $s_y = 0.004$ y-units. Thus $T_y = \pm 3s_y = \pm 0.012$.

Now $\pm T_x$ and $\pm T_y$ may be thought of as 'worst case' values for $(x–x_o)$ and $(y–y_o)$. Substituting T_x for $(x–x_o)$ and T_y for $(y–y_o)$ in the expanded formula for $M(x, y)$, we have

$$MT = K\frac{x_0}{y_0} + T_x\frac{K}{y_0} - T_y\frac{Kx_0}{y_0^2} - 2T_y^2\frac{K}{y_0^3} - T_xT_y\frac{K}{y_0^2} + \text{(higher-order terms)}$$

The T_y^2 and T_xT_y terms, and all terms of higher order, are going to be at least an order of magnitude smaller than terms in T_x and in T_y, and for this reason we drop them, so that

$$MT = K\frac{x_0}{y_0} + T_x\frac{K}{y_0} - T_y\frac{Kx_0}{y_0^2}$$

Thus, a 'worst case' Euclidean distance d of $M(x, y)$ from its ideal value Kx_o/y_o is (approximately)

$$\Delta = \sqrt{\left(T_x\frac{K}{y_0}\right)^2 + \left(T_y\frac{Kx_0}{y_0^2}\right)^2}$$

$$= \sqrt{\left(0.009\frac{K}{y_0}\right)^2 + \left(0.012\frac{Kx_0}{y_0^2}\right)^2}$$

This shows the relative contributions of the components to the variation in the measurement.

As y_o is a known quantity and reduction in T_x and in T_y each carries its own price tag, it becomes an economic decision whether one should spend resources to reduce T_x or T_y, or both.

In this example, we have used a Taylor series approximation to obtain a simple expression that highlights the benefit of T_x and T_y. Alternatively, one might simulate values of $M = Kx/y$, given a specified (T_x,T_y) and (x_0,y_0), and then summarize the results with a model for the variability of M as a function of (T_x,T_y).

13.8 Signal to Noise Ratio

In analog and digital communications, signal-to-noise ratio, often written S/N or SNR, is a measure of signal strength relative to background noise. The ratio is usually measured in decibels (dB).

If the incoming signal strength in microvolts is Vs, and the noise level, also in microvolts, is Vn, then the signal-to-noise ratio, S/N, in decibels is given by the formula

$$S/N = 20 \log10(Vs/Vn)$$

If Vs = Vn, then S/N = 0. In this situation, the signal borders on unreadable, because the noise level severely competes with it. In digital communications, this will probably cause a reduction in data speed because of frequent errors that require the source (transmitting) computer or terminal to resend some packets of data.

Ideally, Vs is greater than Vn, so S/N is positive. As an example, suppose that Vs = 10.0 microvolts and Vn = 1.00 microvolt. Then

$$S/N = 20 \log10(10.0) = 20.0 \text{ dB}$$

Notes

which results in the signal being clearly readable. If the signal is much weaker but still above the noise – say 1.30 microvolts – then

$$S/N = 20 \log10(1.30) = 2.28 \text{ dB}$$

which is a marginal situation. There might be some reduction in data speed under these conditions.

If Vs is less than Vn, then S/N is negative. In this type of situation, reliable communication is generally not possible unless steps are taken to increase the signal level and/or decrease the noise level at the destination (receiving) computer or terminal.

Communications engineers always strive to maximize the S/N ratio. Traditionally, this has been done by using the narrowest possible receiving-system bandwidth consistent with the data speed desired. However, there are other methods. In some cases, spread spectrum techniques can improve system performance. The S/N ratio can be increased by providing the source with a higher level of signal output power if necessary. In some high-level systems such as radio telescopes, internal noise is minimized by lowering the temperature of the receiving circuitry to near absolute zero (-273 degrees Celsius or -459 degrees Fahrenheit).

Self Assessment

Fill in the blanks:

24. In tolerance design, we assume that the distribution of x is …… .
25. ……. ratio, often written S/N or SNR, is a measure of signal strength relative to background noise.
26. Communications engineers always strive to …… the S/N ratio.

Case Study

Loss Function in Developmental Design

The loss function can be used to compute the advantages of being on target with low variation for the distribution of a product characteristic. The following figures describe the relationship between the output voltage and the gain of a power transistor in a regulated power supply circuit. This information is commonly available from transistors manuals and data sheets which are published by the manufacturers of the components.

For a design specification of 115V, it would be necessary to use a transistor with a gain of 20, which would cost approximately 25 cents. The cost of the electronic component depends on the tolerance and the power handling capability. The 25 cent transistor has a tolerance of ±30% which will be assumed to be three standard deviation away from the target value. Hence one standard deviation is equivalent to 10% in tolerance.

Variation in the gain is transmitted to the variation in the voltage. If a normal distribution of the gain is assumed, then a normal distribution of voltage will be obtained. While it is centred around the target of 115V, it is also possible to have a voltage as low as 109 and as high as 121V. If a higher tolerance transistor is used then the tolerance would be reduced. However, this would mean a higher cost in the overall product. To produce the true regulated power supply could then cost up to four times the original design cost.

However, a more cost effective approach is to use the portion of the voltage Vs gain curve that is less steep. In this way, the large variation in gain to the output voltage is not

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transmitted. This part of the curve is around the 40-HFE point. Even with the ±30% tolerance range, the variation in voltage around this point is ± 2 Volts. Hence, it is seen that designing in the constant region of the relationship will reduce the variation.

The output of both transistors, with the output of transistor B is shifted and superimposed over the output of transistor A. From inspection, transistor A will exhibit a large variation in its output voltage. Whereas transistor B will exhibit the opposite characteristics.

To calculate the expected loss, integration of the area of the loss function with the area of the distribution must be preformed. This may be done numerically, point by point, or by combing the distribution function with the loss function.

The results shows that the expected loss (EL) which is related to the standard deviation k and the location of the average of the distribution to be:

$$EL = k[(AL - m)^2 + S^2]$$

The losses for the two transistors can then be calculated as follows:

For transistor A:

$$EL = 0.444[(115 -115)^2 + 2^2]$$

$$EL = \$1.78$$

For transistor B:

$$EL = 0.444[(124 -115)^2 + 0.33^2]$$

$$EL = \$36.01$$

The loss for transistor B is excessive because it is 9 volts of the target. This loss can be minimised by using a higher current limiting resistor.

The loss for transistor B now becomes:

$$EL = 0.444[(115 -115)^2 + 0.33^2]$$

$$EL = \$0.048$$

Question:

What does the above case study depict?

Source: kernow.cortin.edu.au

13.9 Summary

- Failure Modes and Effects Analysis (FMEA) is a step-by-step approach for identifying all possible failures in a design, a manufacturing or assembly process, or a product or service.
- The purpose of the FMEA is to take actions to eliminate or reduce failures, starting with the highest-priority ones.
- Begun in the 1940s by the US military, FMEA was further developed by the aerospace and automotive industries.
- Cause and Effect analysis is carried out by the employees of the organization.
- The FMEA methodology is a team effort where the responsible engineer involves people from assembly, manufacturing, materials, quality, service, and other functional areas.

Notes

- The purpose of FMEA document is to allow all involved engineers to have access to other's thoughts and to design manufacture using collective group thoughts, which promotes team work.
- Quite often, the wrong people perform the FMEA. The quality department ends up developing the documents rather than making design engineers responsible for design FMEAs and operating personnel responsible for process FMEAs.
- FMEA is designed to assist the engineer improve the quality and reliability of design.
- Taguchi Methods utilise two-, three-, and mixed-level fractional factorial designs.
- Taguchi's response to quality differs rather greatly from the goalpost philosophy of the European and American countries.
- A traditional method of improving the quality of a product is the method of adjusting one factor at a time during pre-production experimentation. This method has the major disadvantages of being very costly and unreliable.
- Loss can be measured per part. Measuring loss encourages a focus on achieving less variation.
- To avoid premature replacement of the expensive tools, the manager suggested that operators set the machine to run at the high-end of the specification limits.
- When a product is said to be optimum, it implies that the product has achieved most of the target values set out by the quality measure.
- The design parameters are those nominal product values which are selected by the engineers.
- In analog and digital communications, signal-to-noise ratio, often written S/N or SNR, is a measure of signal strength relative to background noise. The ratio is usually measured in decibels (dB).
- The S/N ratio can be increased by providing the source with a higher level of signal output power.

13.10 Keywords

Cause and Effect Diagram: A graphical statistical technique used to tie multiple possible causes to a significant effect that is generally causing a problem is known as a cause and effect diagram.

Cross Functional Teams: Cross functional teams are the teams of employees representing different functional disciplines and/or different process segments who tackle a specific problem or perform a specific task, frequently on an ad hoc basis.

Design Engineers: Design engineer is a person or firm responsible for designing a project.

Effect Analysis: Effects analysis refers to studying the consequences of those failures.

Factorial Designs: An experimental design in which two or more independent variables are simultaneously manipulated is known as a factorial design. This design permits an analysis of the main effects of the independent variables separately, plus the interaction effects of these variables.

Failure Mode and Effect Analysis: A technique to find the weaknesses in designs before the design is realized, either in prototype or production is known as failure mode and effect analysis.

Failure Mode: Manner in which an equipment or machine failure can occur is called as failure mode.

Notes

Loss Function: Loss function is a graphical representation of a variety of non-perfect parts that can each lead to an overall loss for a company or manufacturer.

Risk Priority Number: In Failure Mode Effects Analysis, the aggregate score of a failure mode including its severity, frequency of occurrence, and ability to be detected is referred to as risk priority number.

Signal-to-noise ratio: It is the ratio of signal intensity to noise intensity.

13.11 Review Questions

1. Explain the meaning of FMEA.
2. Discuss the relationship of cause, failure mode and effect with the help of a suitable diagram.
3. Explain FMEA process with the help of a fishbone diagram.
4. Briefly explain the different stages of FMEA.
5. What are the various benefits of FMEA?
6. What is taguchi philosophy for? Explain its major points.
7. What are the applications of loss function? Explain briefly.
8. Briefly Explain parameter design with the help of a diagram.
9. Mathematically explain Tolerance deign.
10. What do you mean by signal to noise ratio? Mention its formula.

Answers: Self Assessment

1. Failure Mode and Effect Analysis
2. Effects analysis
3. Design
4. Effect
5. Failure
6. Employees
7. Cross functional
8. Participation
9. FMEA document
10. Block diagrams
11. FMEA
12. Objective
13. Increased length
14. Length
15. Design

Notes

16. Quality; reliability
17. Taguchi
18. Good performance
19. Customer satisfaction
20. Non-perfect
21. Loss
22. Parameter design
23. Sources of noise
24. Normal
25. Signal-to-noise
26. Maximize

13.12 Further Readings

Books

Besterfield Dale H. (2011). *Total Quality Management*. Pearson Education.

Charantimath M. Poornima (2009). *Total Quality Management*. Pearson Education.

Mukherjee N. P. (2006). *Total Quality Management.* PHI Learning Pvt. Ltd.

Nigam Shailendra (2009). *Total Quality Management.* Excel Books.

Online links

http://castle.eiu.edu/~pingliu/tec5133/resources/FM.ppt

http://www.slideshare.net/arunkumarkgr/failure-mode-effect-analysis

http://www.denizon.com/quality-assurance/total-quality-management/

http://www.fmeainfocentre.com/handbooks/umich.pdf

Notes

Unit 14: Total Productive Maintenance

CONTENTS

Objectives

Introduction

14.1 What is TPM?

14.2 Planning for TPM

14.2.1 Learning the New Philosophy

14.2.2 Promoting the Philosophy

14.2.3 Training

14.2.4 Identifying Improvement Needs

14.2.5 Setting Improvement Goals

14.2.6 Developing Plans

14.2.7 Autonomous Work Groups

14.3 Summary

14.4 Keywords

14.5 Review Questions

14.6 Further Readings

Objectives

After studying this unit, you will be able to:

- Define total productive maintenance
- Explain the planning for TPM

Introduction

Previous unit gave you an insight on FMEA approach and the various stages of FMEA process. This unit will help you study about the concept of total productive maintenance.

TPM is an innovative Japanese concept. The origin of TPM can be traced back to 1951 when preventive maintenance was introduced in Japan. However the concept of preventive maintenance was taken from USA. Nippon Denso was the first company to introduce plant wide preventive maintenance in 1960. The aim of productive maintenance was to maximize plant and equipment effectiveness to achieve optimum life cycle cost of production equipment.

14.1 What is TPM?

TPM is an organization wide effort aimed at reducing loss due to equipment failure, slowing speed, and defects. Japan Institute of Plant Maintenance (JIPM) defines TPM as a system of

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maintenance covering the entire life of equipment in every division, including planning, manufacturing, and maintenance. TPM involves everyone, from top executives to shop floor workers to promote productive maintenance through morale building management and small group activities in an effort to maximize equipment efficiency.

It can be considered as the medical science of machines. Total Productive Maintenance (TPM) is a maintenance program which involves a newly defined concept for maintaining plants and equipment. The goal of the TPM program is to markedly increase production while, at the same time, increasing employee morale and job satisfaction.

TPM brings maintenance into focus as a necessary and vitally important part of the business. It is no longer regarded as a non-profit activity. Down time for maintenance is scheduled as a part of the manufacturing day and, in some cases, as an integral part of the manufacturing process. The goal is to hold emergency and unscheduled maintenance to a minimum.

TPM was introduced to achieve the following objectives. The important ones are listed below:

- Avoid wastage in a quickly changing economic environment.
- Producing goods without reducing product quality.
- Reduce cost.
- Produce a low batch quantity at the earliest possible time.
- Goods send to the customers must be non-defective.
- Achieve maximum effectiveness of the equipment.
- Involve all equipment operators in developing maintenance skills.
- Improve reliability of the equipment.
- Achieve an economic balance between prevention costs and total costs while reducing failure costs.

Example: Companies that apply TPM-

1. Delicia
2. Heineken
3. Unilever
4. Solvay

Self Assessment

Fill in the blanks:

1. TPM is an innovative ……. concept.
2. …….. was the first company to introduce plant wide preventive maintenance in 1960.
3. TPM is an organization wide effort aimed at reducing ……..due to equipment failure, slowing speed, and defects.
4. The goal of the TPM program is to markedly increase …… while, at the same time, increasing …… and job satisfaction.

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14.2 Planning for TPM

The first step in implementing Total Productivity Maintenance is assessment of current performance. It helps in understanding current level of performance so that future plans for improvement can be implemented. Thus organizations need to assess existing maintenance system, current condition of plant and equipment. Understanding the current system also helps whether existing system can be improved or a new system has to replace the existing one. TPM implementation in general consists of the following steps:

1. Management learning new philosophy
2. Management promoting new philosophy
3. Training everyone in the organization
4. Identifying areas of improvement
5. Formulating performance goals
6. Developing an implementation plan
7. Establishing autonomous work groups.

14.2.1 Learning the New Philosophy

Proper understanding, commitment and active involvement of the top management in needed for this step. Senior management should have awareness programs, after which announcement is made to all.

Notes Top management must understand how TPM will affect the operations of the organization. Top management should also be aware of resistance to change and how it can deal the same.

TPM call for cultural change, and any cultural change needs dedication from top management and its support for long-term improvement. TPM calls for tapping of unused resources of the organization especially the intellectual capital of its employees in the form of their problem solving ability. Hence people at the lower level must be empowered to make decisions. Thus top management must learn the new philosophy of managing things differently to involve all the employees.

14.2.2 Promoting the Philosophy

Senior management needs support of all the employees of the organization for successful implementation of TPM and hence it must spend significant time in promoting the new system. Top management must sell the idea as it requires complete commitment from all the employees. It also needs commitment from all the top management representatives of the organization. If the employees and management do not believe in new philosophy and they are committed to the same, then TPM may be failure in the organization resulting in waste of resources.

Caution Top management should have long-term commitment and it should not focus on short-term gains as commitment to long-term investment is the key.

Management has the responsibility of promoting the new philosophy and hence mangers should become role models by practicing the new philosophy and leading others. Top managers shall actively involve and exhibit their keen interest in new philosophy. Management should also

give more autonomy to maintenance and production personnel. If employees understand the seriousness of commitment and efforts of top management in implementing TPM, then employees will respond positively and put their efforts in implementation.

14.2.3 Training

Training is the backbone for success of TPM. All employees including top managers, front level supervisors and shop floor employees need to be trained. Training shall focus not just how TPM can be implanted, but should stress why it is needed and what are the possible advantages of TPM.

Top management should spend time in undergoing training and managers should learn and understand impact of applying TPM philosophy in their organizations. Training shall focus on attitudinal change among managers and if managers fail to understand the need for TPM they may need to be replaced. Those who support and actively involve in new philosophy should be identified and they must undergo thorough training.

Team approach is the key for implementation of TPM as TPM calls for autonomous teams.

Notes Middle management must learn how to deal with team approach and how to develop small autonomous work groups.

Since it requires change in the management approach, some resistance to change may be inevitable. Hence awareness for need to change is very important among the middle management executives. Thus training to middle management must address the issues of structural changes which are needed for implementation of TPM.

Front line supervisors are backbone for TPM as they play a major role in productivity improvement projects. Hence they must understand the need for TPM and role of supervisors in implementing TPM. Supervisors must realize that they need to delegate authority to lower levels as they need more autonomous teams at operating level. Role of supervisors as effective coaches is also very important.

Caution Supervisory training should focus on providing leadership at shop floor level for implementing TPM.

Employee's involvement is the most important need for TPM. Employees should be capable of working in autonomous work groups. Hence they should learn about various tools used in performing new tasks needed for TPM as part small autonomous teams. Training shall focus on role of production people and maintenance people and need for working in cross functional teams.

Caselet

Implementing Total Productive Maintenance by David McBride

As we conduct lean assessments at manufacturing facilities throughout the region, I have noticed organizations increasingly embracing lean concepts. But one key area that often falls by the wayside is equipment maintenance. I repeatedly see

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facilities in which there is a complacent attitude about equipment maintenance and reliability. "Equipment is expected to fail." Maintenance is primarily reactive. Where they exist, preventive maintenance plans are sketchy, often ignored, and not used because "we're experienced." Large inventories of spare parts are stored in conditions that significantly reduce their useful life. Operators ignore the early warning signs of pending failure. Furthermore, I always hear at least 10 reasons why "we can't change the way we do things around here."

What if other industries took the same path as these organizations? Take, for example, the aircraft maintenance industry. There is a high degree of discipline from the certifications of those who perform the maintenance to the suppliers of parts and materials used on the job. Procedures are very specific and every process and step is documented. Consequently, with over 27,000 take-offs and landings every day in the U.S., aircraft crashes due to equipment failure rarely happen. Another good example is NASCAR Winston Cup racing. The best-of-the-best in stock car racing depend on reliable equipment to do their job; every race car must meet rigid safety guidelines and has to be reliable. The old saying in the pits is: "If you can't finish, you can't win." Achieving 100 percent reliability takes discipline and teamwork. Organizations that want to compete and become "World Class" need to successfully implement Total Productive Maintenance (TPM) programs.

TPM requires effective leadership from the start. That is part of the meaning of "total" in Total Productive Maintenance. Without effective leadership that links TPM efforts to the business and holds people accountable for performing highly specified work, equipment performance and reliability will continue to decline and TPM initiatives will be short-lived. Many of today's business leaders have risen through the ranks when maintenance was only responsible for "fixing things" – not for preventing problems. Viewing maintenance as a non-value-adding support function, they often subject the maintenance department to severe cost-cutting; this usually results in higher costs due to decreased equipment effectiveness.

Companies that have been successful usually follow an implementation plan that includes the following 12 steps:

Step 1: Announcement of TPM. Top management needs to create an environment that will support the introduction of TPM. Without the support of management, skepticism and resistance will kill the initiative.

Step 2: Launch a formal education program. This program will inform and educate everyone in the organization about TPM activities, benefits, and the importance of contribution from everyone.

Step 3: Create an organizational support structure. This group will promote and sustain TPM activities once they begin. Team-based activities are essential to a TPM effort. This group needs to include members from every level of the organization from management to the shop floor. This structure will promote communication and will guarantee everyone is working toward the same goals.

Step 4: Establish basic TPM policies and quantifiable goals. Analyze the existing conditions and set goals that are SMART: Specific, Measurable, Attainable, Realistic, and Time-based.

Step 5: Outline a detailed master deployment plan. This plan will identify what resources will be needed and when for training, equipment restoration and improvements, maintenance management systems and new technologies.

Step 6: TPM kick-off. Implementation will begin at this stage.

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Step 7: Improve effectiveness of each piece of equipment. Project Teams will analyze each piece of equipment and make the necessary improvements.

Step 8: Develop an autonomous maintenance program for operators. Operators routine cleaning and inspection will help stabilize conditions and stop accelerated deterioration.

Step 9: Develop a planned or preventive maintenance program. Create a schedule for preventive maintenance on each piece of equipment.

Step 10: Conduct training to improve operation and maintenance skills. Maintenance department will take on the role of teachers and guides to provide training, advice, and equipment information to the teams.

Step 11: Develop an early equipment management program. Apply preventive maintenance principles during the design process of equipment.

Step 12: Continuous Improvement. As in any Lean initiative the organization needs to develop a continuous improvement mindset.

Maintenance and reliability as a core business strategy is key to a successful TPM implementation. Without the support of top management, TPM will be just another "flavor of the month." Implementing TPM using the above 12 steps will start you on the road to "zero breakdowns" and "zero defects."

Question

Critically analyse twelve steps of TQM.

Source: www.crnsstrategies.com

14.2.4 Identifying Improvement Needs

People at the operational level can throw better light on needs of improvements. Maintenance technicians have better knowledge about which machines are on the verge of breakdown, which machines need more attention for maintenance activities. Hence employees who work with machines on their day-to-day work are better capable of identifying the improvement needs than any other employees. Therefore involvement of operators and maintenance technicians is very important in identifying improvement needs. Opinion of these employees on which systems and machines need more urgent attention has to be taken into consideration. This may need constitution of an implementation team consisting of production operators and maintenance technicians.

The teams constituted should focus on current level performance and this can be done in the form of assessment existing systems. Japanese TPM practitioners have developed following measurements for identifying improvement needs. These measurements are six major areas of losses so that how improvements can reduce them. They are listed below:

Down Time Losses

1. Planned
   a. Start-ups
   b. Shift changes
   c. Coffee and lunch breaks
   d. Planned maintenance shut downs
2. Unplanned Downtimes
   a. Equipment breakdown
   b. Change overs
   c. Lack of materials

Notes

Reduced Speed Losses

3. Idling and minor stoppages
4. Slow-downs

Poor Quality Losses

5. Process non-conformities
6. Scrap

These losses can be quantified into three metrics and can be summarized into equipment effectiveness metric. Equations for these metrics are explained below:

Downtime losses are measured by equipment availability using the equation

$$A = (T/P) \times 100$$

Where, A = availability

T = Operating time (P-D)

P = Planned operating time

D = Downtime

Reduced speed losses are measured by tracking performance efficiency using the equation

$$E = (C \times N/ T) \times 100$$

Where E = Performance efficiency

C = Theoretical cycle time

N = Processed amount (quantity)

Poor quality losses are measured by tracking the rate of quality products using the equation

$$R = ((N-Q)/ N) \times 100$$

Where R = Rate of quality of products

N = Processed amount (quantity)

Q = Non-conformance

Equipment effectiveness is measured as the product of the decimal equivalent of the three previous metrics using the equation

$$EE = A \times E \times R$$

Where, EE = Equipment effectiveness

Or

Overall Equipment Effectiveness (OEE)

Thus improvement needs can be expresses in terms of amount of increase in OEE.

14.2.5 Setting Improvement Goals

Goals should be set for the improvement after improvement needs are identified. A time frame for improvement project should be clearly defined. Priorities for improvement projects should be developed. Project teams should be involved in setting these improvement goals.

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14.2.6 Developing Plans

The next step in successful implementation of TPM is developing an implementation and training program. Plans for developing autonomous work groups should take place during the training phase. Plans should focus on use of teams consisting of maintenance technicians and machine operators in production departments to work troublesome problems which may require urgent attention. They can determine priorities for improvement and management must commit resources which are required for correcting these problems. Use of teams in the initial stages can lead to future development of autonomous work groups. Hence plans must be prepared gradual changes in restructuring the organization into small autonomous work groups.

14.2.7 Autonomous Work Groups

Autonomous work groups are established based on the natural flow of activity. Operators must be made responsible for the equipment and level of maintenance that they are capable of performing. Maintenance personnel with necessary skill levels should be identified. Operators and maintenance personnel are brought together in the form of autonomous work teams. These groups must have authority to make decisions about keeping the machines in good working condition. The structure of the autonomous work groups may depend on the type of the industry and nature of application. Maintenance technicians should be consultants for production personnel. Maintenance personnel can also train production personnel on basic maintenance activities like oiling, minor troubleshooting, setting up, etc. The overall objective of autonomous work groups is to reduce time spent on maintenance activity.

Task Prepare a flow chart explaining the various steps involved in TPM implementation.

Self Assessment

Fill in the blanks:

5. The first step in implementing Total Productivity Maintenance is assessment of…… .
6. …… should have awareness programs, after which announcement is made to all.
7. TPM calls for tapping of …… resources of the organization.
8. Top management should have …… commitment and it should not focus on …….. gains.
9. …… is the backbone for success of TPM.
10. …… approach is the key for implementation of TPM.
11. Front line supervisors are backbone for TPM as they play a major role in ……. projects.
12. …….. involvement is the most important need for TPM.
13. People at the ……. level can throw better light on needs of improvements.
14. Plans for developing autonomous work groups should take place during the …… phase.
15. Autonomous work groups are established based on the ……. of activity.
16. …… technicians should be consultants for production personnel.

Notes

Caselet

Fine Papers, South Africa

TQM has Positive Impact on Paper Manufacturers

Fine Papers, a South African subsidiary of Sappi Limited, London, consisted of three mills, Enstra, Stanger and Adamas. The implementation of both TQM and Reliability Centred Maintenance (RCM) at the Enstra mill, an uncoated paper manufacturing unit, achieved a positive impact on availability, reliability, quality and the elimination of waste. However, quality was still variable and needed to be inspected throughout the process. As a further improvement, Statistical Process Control (SPC) was introduced, process standards were developed, and capability studies carried out. As a result, production processes were simplified, quality was in-built at source and a move from inspection to prevention was achieved. However, something was still lacking and the mill decided to implement Total Productive Maintenance (TPM). TPM is an approach that improves product and process reliability, which are important concepts in TQM. As part of the implementation of TPM:

1. A multi-disciplinary team, chaired by the production superintendent, was formed and this enabled supplier issues such as non-conformance with specification of raw materials to be addressed immediately; the supplier could be brought to the meeting if required.
2. Autonomous maintenance tasks that enhanced and built on RCM methodologies were identified as: a) setup; b) minor adjustments; c) machine cleaning (to clean is to inspect, which is a basic premise); d) bolting (operators checking if bolts were tight).
3. Identified training issues could also be addressed immediately by the human resources representative.
4. Operational level day-to-day proactive problem identification and solving was carried out using tools like the "five whys" to check whether other possible causes of failure had been addressed-or whether failure could have been prevented and what was needed to prevent possible reoccurrence of the failure.
5. Any problems identified were put on a gap list. Any gap that could not be closed by the Strategic Business Unit team was then passed to the team at the next level, which was known as the focus team.
6. A third-level team, called the integration team, was set up to solve problems at the systemic level and a fourth level team, the strategic team, chaired by the general manager and comprising all the heads of departments, was made responsible for strategic issues and the entire productivity journey.

Staff agreed that TPM helped the company as a result of its structured and systematic solution approach

Source: http://timesofindia.indiatimes.com/city/pune/DRDO-labs-adapting-to-TQM/articleshow/839174.cms

14.3 Summary

- TPM is an organization wide effort aimed at reducing loss due to equipment failure, slowing speed, and defects.
- TMP involves everyone, from top executives to shop floor workers to promote productive maintenance through morale building management and small group activities in an effort to maximize equipment efficiency.
- The goal of the TPM program is to markedly increase production while, at the same time, increasing employee morale and job satisfaction.

Notes

- The first step in implementing Total Productivity Maintenance is assessment of current performance.
- Understanding the current system also helps whether existing system can be improved or a new system has to replace the existing one.
- Top management must understand how TPM will affect the operations of the organization. Top management should also be aware of resistance to change and how it can deal the same.
- Senior management needs support of all the employees of the organization for successful implementation of TPM and hence it must spend significant time in promoting the new system.
- Top management should have long-term commitment and it should not focus on short term gains and commitment to long-term investment is the key.
- All employees including top managers, front level supervisors and shop floor employees need to be trained. Training shall focus not just how TPM can be implanted, but should stress why it is needed and what are the possible advantages of TPM.
- Middle management must learn how to deal with team approach and how to develop small autonomous work groups.
- Employees should be capable of working in autonomous work groups. Hence they should learn about various tools used in performing new tasks needed for TPM as part small autonomous teams.
- The teams constituted should focus on current level performance and this can be done in the form of assessment existing systems.
- Plans should focus on use of teams consisting of maintenance technicians and machine operators in production departments to work troublesome problems which may require urgent attention.
- The overall objective of autonomous workgroups is to reduce time spent on maintenance activity.

14.4 Keywords

Cultural Change: A shift that may occur within a culture, usually as a result of outside influences is known as a cultural change.

Employee's Involvement: Giving employees input and allowing them an impact on decisions affecting their jobs is referred to as employee's involvement.

Intellectual Capital: The term intellectual capital collectively refers to all resources that determine the value and the competitiveness of an enterprise.

Life Cycle Cost: It is the concept of including acquisition, operating, and disposal costs when evaluating various alternatives.

Performance Efficiency: Performance efficiency is the ratio (percentage) of the actual output of a person as compared to the desired or planned output.

Preventive Maintenance: An equipment maintenance strategy based on replacing, overhauling or remanufacturing an item at a fixed interval, regardless of its condition at the time is referred to as preventive maintenance.

Team Approach: An approach to assessment that requires the active involvement of professionals from many fields, parents, perhaps the person with a disability, and other interested parties is known as team approach.

Notes

Total Productive Maintenance: A series of methods, originally pioneered to ensure that every machine in a production process is always able to perform its required tasks so that production is never interrupted is known as total productive maintenance.

Training: The action of teaching a person or animal a particular skill or type of behavior is called as training.

14.5 Review Questions

1. Briefly explain TPM and its objectives.
2. Discuss the planning step in total productivity maintenance.
3. Explain the areas of improvement which can be achieved through TPM.
4. What are the various attributes required for implementation of TPM in an organization?
5. What steps should be taken by the top management to promote the TPM philosophy?
6. Mention the various departments involved in the training stage of TPM implementation. Why do you think are they important?
7. Why TPM needs autonomous workgroups? Explain.
8. Mathematically explain downtime losses.
9. Explain different metrics used for measurement in TPM.
10. Explain the relationship between TPM and TQM.

Answers: Self Assessment

1.	Japanese	2.	Nippon Denso
3.	Loss	4.	Production; employee morale
5.	Current performance	6.	Senior management
7.	Unused	8.	Long-term; short term
9.	Training	10.	Team
11.	Productivity improvement	12.	Employee's
13.	Operational	14.	Training
15.	Natural flow	16.	Maintenance

14.6 Further Readings

Books

Besterfield Dale H. (2011). *Total Quality Management*. Pearson Education.

Charantimath M. Poornima (2009). *Total Quality Management*. Pearson Education.

Mukherjee N. P. (2006). *Total Quality Management*. PHI Learning Pvt. Ltd.

Nigam Shailendra (2009). *Total Quality Management*. Excel Books.

Online links

http://et.nmsu.edu/~etti/fall97/manufacturing/tpm2.html

http://www.reliableplant.com/Read/8481/total-productive-maintenance

http://www.hutchins.co.uk/Ar_TPM.aspx

http://www.tvss.net/pm/tpm.htm

http://www.leanproduction.com/tpm.html